IN THIS ISSUE

STEEL The Metalworking Weekly

November 18, 1957
Vol. 141 No. 21

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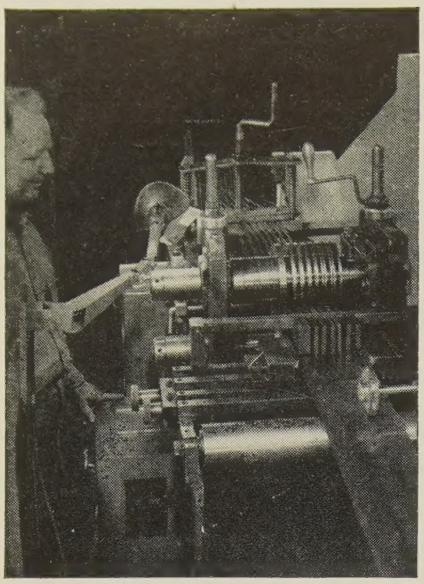


YODER SLITTERS
Supply
Varied Strip Widths for
Tinnerman *Speed Nuts*®

Tinnerman Products, Inc., Cleveland, Ohio, produces more than 10,000 different shapes and sizes of "SPEED NUT" brand fasteners for industry . . . many of them to special specifications.

To do this, Tinnerman uses slit steel strands ranging in width from ⅛" to 7½". To carry an inventory of the many strip widths required to meet normal and unusual demands would be almost impossible.

Tinnerman overcomes these inventory and supply problems by doing their own slitting on two Yoder slitters. This enables them to supply the plant with any strip size required from a relatively small inventory of 6" and 9" width purchased coils. In slitting narrow strands, such as these from small coils, a Yoder slitter may be profitable on a production as low as 25 tons per month.

Here is a fine example of how a small investment in Yoder slitting equipment greatly simplifies and speeds production while effecting important operating economies.

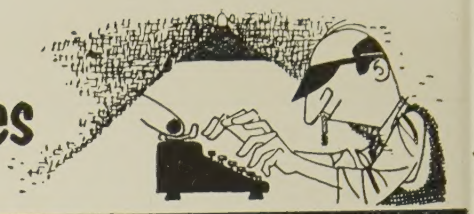
The saving made in time alone, reflects in better customer service through faster completion and delivery of finished products.

If your steel strip or sheet slitting requirements are as low as 100 tons per month or even less, a medium size Yoder slitter can be a very profitable investment for you. The Yoder line includes units of every size and capacity . . . of the most advanced engineering design. Send for the Yoder Slitter Book —a comprehensive text on the mechanics and economics of slitters and slitting line operation, with time studies, cost analyses and other valuable data. Write to:

THE YODER COMPANY
5502 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING ROTARY SLITTING LINES

behind the scenes



First Arabian Niter

An Arabian gentleman by the name of Jeber was always messing around with restless and stinking compounds. One day in 750 A.D. he mixed up a batch of niter, alum, and sulfate of iron, cooked it down to a distillate, stuck in his finger, and was instantly sorry: He had discovered nitric acid. "The world will little note nor long remember what we say here," mumbled Mr. Jeber, absently starting to suck his finger and quickly changing his mind, "but it can never forget what we did here," and that old boy never knew how right he was. Why, if it hadn't been for Mr. Jeber, Machine Tool Editor Robert Huber wouldn't have had much of a story to write, beginning on Page 153. This story is about photoforming, the precision etching of metal parts by chemical and electrolytic means.

The way we get it, some television people wanted a 21-in. sheet of metal 0.007 in. thick (that's not much thicker than the cover of the magazine you are now holding), and they wanted it filled with about 500,000 tiny, perfectly tapered holes. Obviously, this was beyond the facilities of everybody except magicians, wizards, and elves, so the television folks turned to photoforming. The drawing of the piece was reproduced photographically, printed on metal; the metal was etched with acids, just as they do in photoengraving.

Secret Formula Stuff

The whole thing, of course, is simply a development of Jeber's discovery. After he made a liquid that would eat a metal, the world was never the same. Acids came thick and fast during the golden age of alchemy; some ate iron; others ate glass, wood, tin, fat, and so forth.

Well, as metals grew more diverse and varied, various blends and concentrates of acids were required to etch them. Low carbon steels, for example, are easily etched, whereas reactive metals present more difficulties. When we first saw the story about photoforming, we inquired about the acids that were used. The answer was always "suitable chemical bath," or "proper chemical solution," but we never got a specific answer.

Never mind the tiny holes eaten through a thin section of metal: What was the stuff that ate them?

You, of course, will be more interested in the commercial, engineering, and industrial angles of the story.

That's Our Congress!

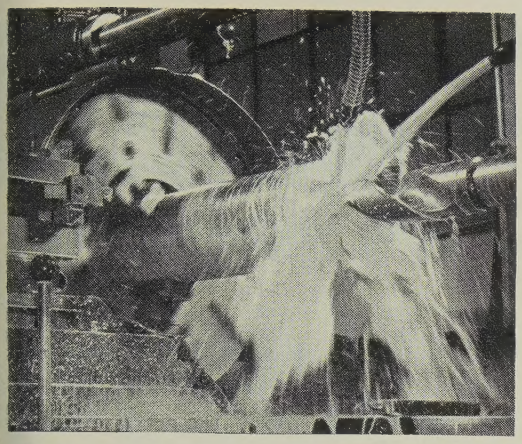
We're usually last in line to hear anything new or interesting (not counting what we see in STEEL, of course), so it may come as no surprise to you if we quote an item that was quoted by the F. W. Dodge Corp.'s *Building Business*. The item in question was originally reported in the *New York Times* during the closing days of the recent Congress. It seems that a bill to build a four-lane tunnel under the Potomac River was amended by changing "four-lane tunnel" to "six-lane, fixed-span bridge." Another amendment added ". . . with bascule span," meaning a drawbridge. Congressmen were informed that bridges have to be fixed spans or draws, but not both. So the House voted to put the whole four-or-six-lane, fixed-span tunnel drawbridge on the shelf—and that's an engineering feat that might even stump the entire personnel of Purdue University.

Rating Drops

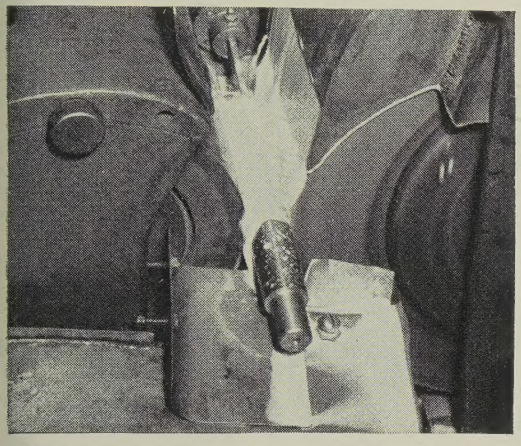
Everybody solves our easy puzzles, but last week the indispensable Charlsie, of General Steel Castings Corp., Granite City, Ill., wrote that the puzzle took second place. She said the crew's full attention was engaged by a midmorning snack brought in by Dale Letterman. But nobody ate much because the snack was a can of roasted caterpillars. Well, it comes sometimes to every man, but it sort of makes you catch your breath, neighbor, when you learn that you are playing second fiddle to a caterpillar!

Shrdlu

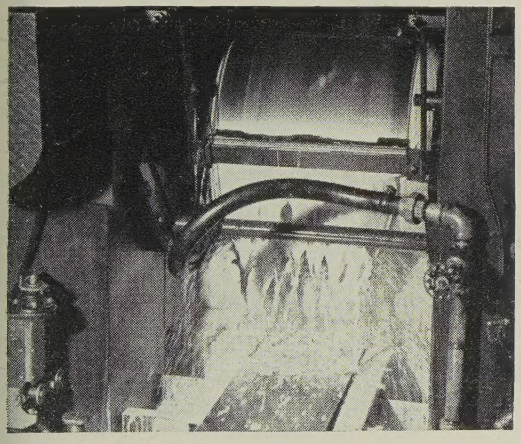
(Metalworking Outlook—Page 103)



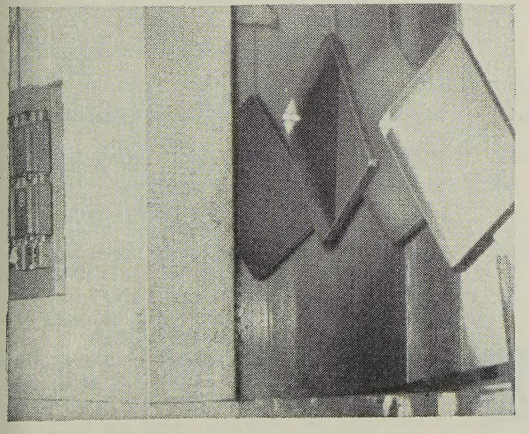
CUTTING



GRINDING



ROLLING



WASHING

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The S.E.C.O. series will meet all your emulsifying oil needs

REGULAR • Sunoco® Emulsifying Cutting Oil (S.E.C.O.) is a low-cost general-purpose oil for most cutting and grinding applications. Operators like S.E.C.O.—it makes clean emulsions that stand the gaff of long production runs. Its superior rustproofing ability protects both machines and work.

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SPECIAL • Custom grades of Sunoco Emulsifying Cutting Oil are made to meet unusual hard-water conditions. Other special formulations are used in rolling steel, brass, aluminum . . . in hot and cold washing . . . in rustproofing . . . and in many other applications.

FOR FULL INFORMATION: Call your Sun representative or write for Technical Bulletin 16 (S.E.C.O.) and Technical Bulletin 11 (S.E.C.O. HD). Write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-11.

Industry uses more Sunoco Emulsifying Oil than any other emulsifying oil.

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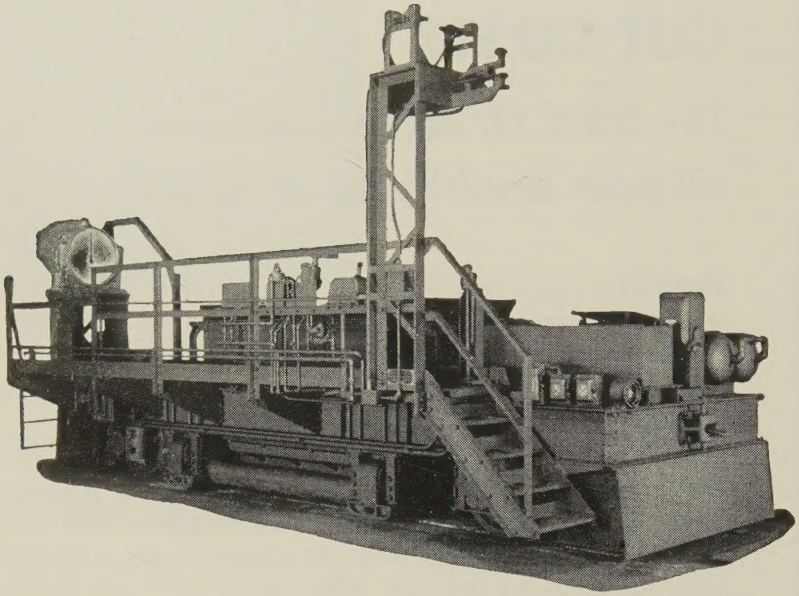
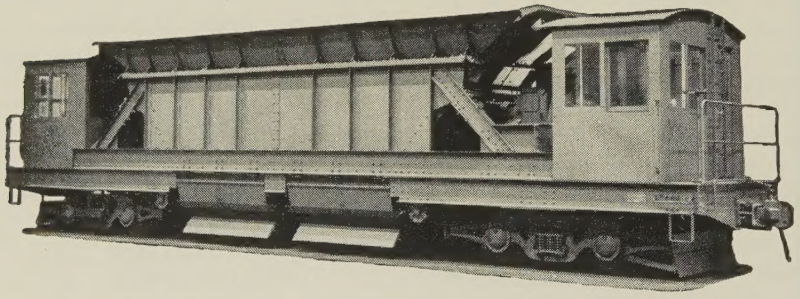
HERE'S *built-in* STAMINA *that spells* DEPENDABILITY

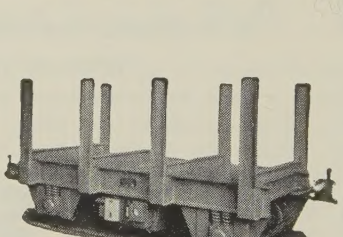


10-TON SCALE CAR, SINGLE HOPPER, BOTTOM DUMP



75-TON ORE TRANSFER, GABLE BOTTOM, SIDE DUMP

Atlas "single-lever" Safety-Type transfers give outstanding short-haul service . . . such as between buildings, for cross-bay crane service, and movement in production. Powered to meet your operating needs . . . storage battery, diesel or gas-electric, or cable reel.



Request "Walk-Along" Bulletin 1283

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS TO THE EDITORS

Wealth of Information

Could we have about 16 copies of th 1957 Metal Selector (Oct. 28, Page 169 for our salesmen. We think you hav done a marvelous job. It contains wealth of information.

D. L. Colwe
Vice Presider
Apex Smelting C
Clevelan

We think of the 1957 Metal Selecto as the best available guide on meta properties.

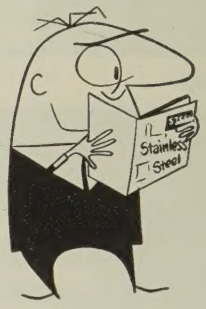
Charles W. Brigg
Technical & Research Directo
Steel Founders' Society of Americ
Clevelan

Interesting Warehouse Article

May I have a copy of the articl "Figures Talk to Warehouses?" (Oct 21, Page 48)? It is one of the mos interesting articles on the warehous business I have read in some time.

C. G. Stort
Inventory Planne
Atlas Steels Ltd
Welland, On

Kudos on Stainless Steel Repor



As one who has worked to publiciz stainless steel since 1949, let me b among the first to congratulate you fo your splendid coverage of the subjec in your 16-page article, "Stainless Steel" (Nov. 4, Page 107).

I especially like your monumenta survey of users. You have done th entire industry a magnificent servic by this coverage. While my company keeps all issues of STEEL in its library this one will be supplemented by ex tras since it is certain to get dog-eared soon.

Stuart D. Gouldin
Arthur Schmidt & Associates Inc
New York

Wider Foil Widths Available

I enjoyed your interesting progress report, "Look What's Happening t Honeycombs" (Oct. 14, Page 116).

I notice you state under the para graph heading "Production," that stain less 17-7 PH and Type 321 are avail able as foils up to 12 in. wide. You also say that thin sheets (0.005 in. min imum) are available only as wide as 16 in.

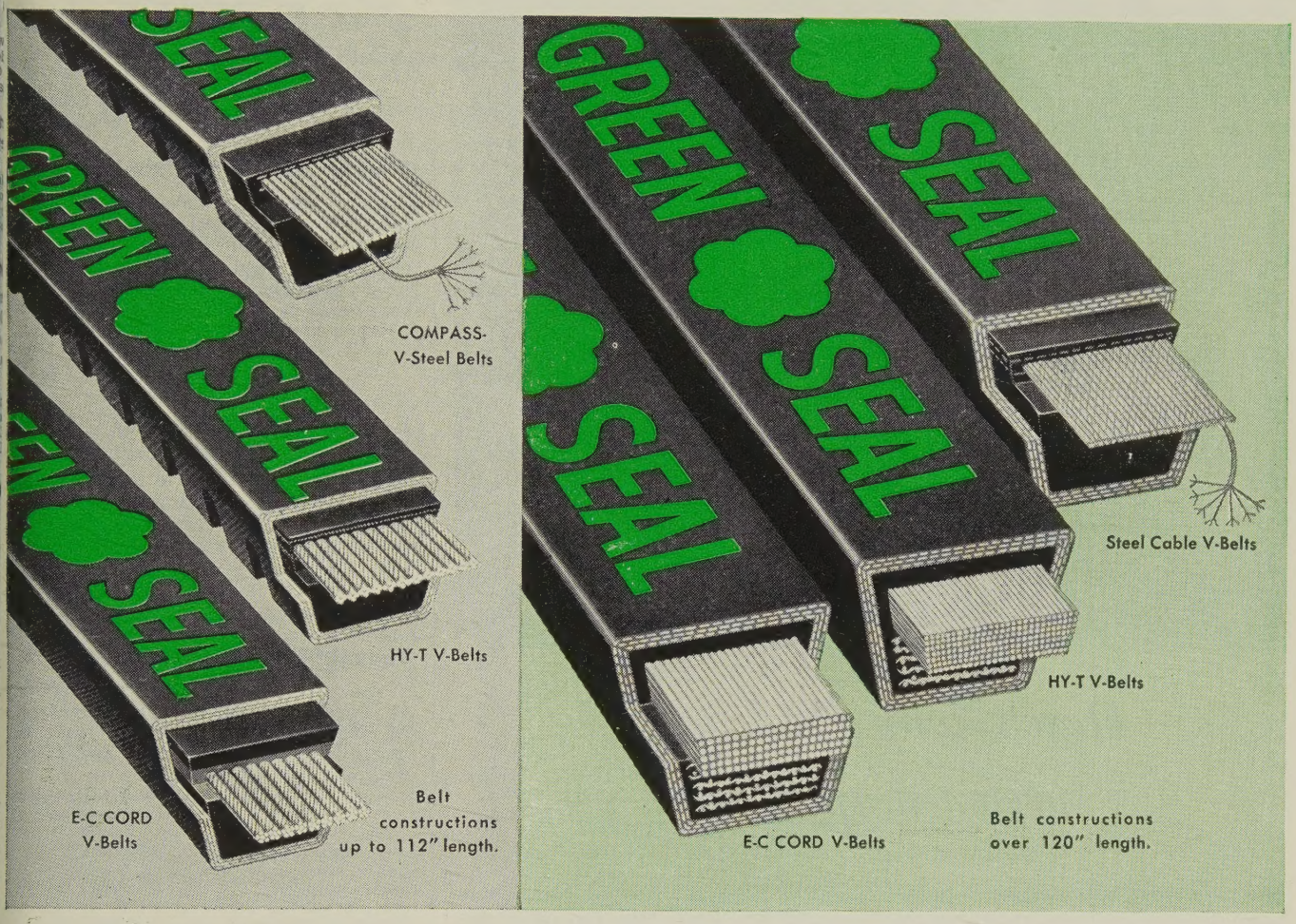
I felt you should be informed that our 25-in. Sendzimir mill has been roll ing Types 321, AM-350, and other steels as light as 0.0015 in. and up to 25 in wide.

A few months ago, we started rolling

(Please turn to Page 12)

Do you know the inside story of

V-Belts with the Green Seal?



Until recently dimensional stability was possible only in V-Belts with steel load-carriers as developed by Goodyear. But now you can have that stability in a complete line of belts – thanks to the development of Triple-Tempered (3-T) cord–synthetic cord tempered by Tension, Temperature and Time.

What's your pay-off from this dimensional stability?

When you're belting multiple drives, it's your one guarantee that every set of matched belts will *really* match. No matter how long you store them, they'll *stay* matched, too.

And once they're installed, you've got belts designed and built to work as a perfect team–without individual belts either "loafing" or overworking. In fact, you're protected from all the usual mismatching headaches that also include slipping, stretching, scorching.

In other words, you're belted for maximum trouble-free horsepower hours at minimum cost. There's no substitute for that kind of performance – or for the V-Belts with the Green Seal that give it to you – every time.

So see your dealer about the V-Belts with true dimensional stability–the V-Belts with the Green Seal. Or write Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

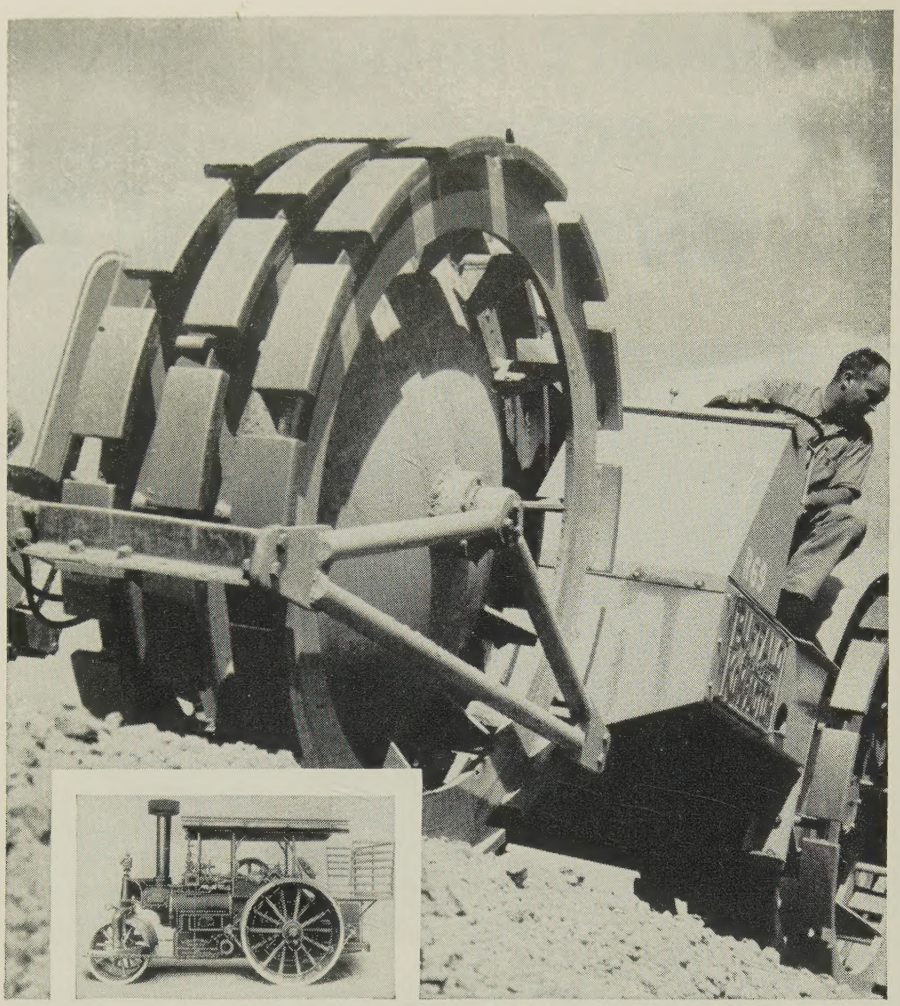
DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass, E-C Cord, Hy-T, Green Seal–T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Watch "Goodyear Theater" on TV – every other Monday 9:30 P.M., E.S.T.



Here's why the leaders prefer a specialist

The ponderous but effective Buffalo-Springfield steam road roller was a common sight during the early transition from steam to diesel-powered machines . . . when Buffalo-Springfield first began standardizing on Twin Disc products.

Today Buffalo-Springfield continues using Twin Disc products . . . and standardizes on a Twin Disc 1500 Series Single-Stage Torque Converter and two Model CL Clutches in its modern, highly efficient K-45 Kompactor shown above.

Why has Buffalo-Springfield stayed with Twin Disc all these years?

Because Twin Disc *specializes* in a complete line of industrial products for applying and controlling power . . . and backs its products with a world-wide parts and service network. Friction Clutches are available in capacities to 1050 hp . . . Fluid Couplings to 850 hp . . . Three-Stage Torque Converters to 1000 hp . . . and Single-Stage Torque Converters to 212 hp. Twin Disc can offer customers *unbiased* engineering recommendations . . . for Twin Disc makes them all.

Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.

TWIN DISC

Friction Clutches and Fluid Drives

LETTERS

(Concluded from Page 10)

on a new, 26-in. Sendzimir mill and are now fully equipped to produce as much as 20 tons per month of bright annealed with these specs: 0.001 in. up to 25 in. wide and more, in gages 0.0015 in. and heavier. We can produce these sizes in Type 321, AM-350, AM-355, A-286, and many others.

As we get experience on our new mill, we probably will be able to roll as light as 0.00075 in. by 25 in. wide.

John A. Boyd
Assistant Sales Manager
Wallingford Steel Co.
Wallingford, Conn.

Timely Missile Article

The article, "Missiles in Quantity Soon?" (Oct. 7, Page 119), is both timely and extremely helpful. It is the best I have read in any of the technical magazines. I think the missile scoreboard is excellent and well done. I would appreciate a copy.

V. C. Aiken
P.O. Box 259
Silverdale, Wash.

Article Helps Company

We will appreciate your sending four copies of article No. 11 in STEEL's Modern Brazing Series, "Brazing Alloy Selector" (Oct. 7, Page 162). We find your articles interesting and often helpful.

Mrs. G. A. Fleming
Abrasive Dressing Tool Co.
Detroit

Thought-Provoking Article

Your article, "Make or Buy?" (Oct. 14, Page 105), was thought provoking. My department has a regular make or buy committee in operation, and I feel we could use a reprint.

D. E. Regan
Superintendent
Feeder Section
Power Tube Mfg.
Electronic Tube Div.
Westinghouse Electric Corp.
Elmira, N. Y.

Please enter our order for 175 copies.

Arthur E. Schulz
Advertising Manager
Industrial Div.
Ex-Cell-O Corp.
Detroit

Lauds STEEL's Research

We would appreciate six reprints of the article, "The Case for Direct Reduction" (Oct. 28, Page 180). It is excellent and denotes a lot of research on your part. We feel it is extremely helpful.

Robert R. Hendren
General Sales Manager
Hoeganaes Sponge Iron Corp.
Riverton, N. J.

Provide Good Information

We have enjoyed the nine articles published so far in your 1957 Program for Management. They are interesting and provide a lot of good information for our use. Please send me a copy of each.

Donn P. Hershberger
Personnel Manager
Norwood Plant
Heekin Can Co.
Cincinnati

CALENDAR
OF MEETINGS

Nov. 18-21, Air Conditioning & Refrigeration Exposition, International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Nov. 19-21, Investment Casting Institute: Fall meeting, Sheraton Hotel, Chicago. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: H. P. Dolan.

Nov. 20, American Iron & Steel Institute: Regional technical meeting, Warwick Hotel, Philadelphia. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

Nov. 21, National Industrial Conference Board Inc.: General session for all associates, Hote Schroeder, Milwaukee. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Nov. 21-22, American Management Association: Special marketing conference on organizing a new product program, Statler Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. Secretary: Andrew P. Donovan.

Nov. 25-27, American Management Association: Special conference on "Operations Research," Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Dec. 1-6, American Society of Mechanical Engineers: Annual meeting, Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Dec. 2-6, Exposition of Chemical Industries: Coliseum, New York. Information: International Exposition Co., 480 Lexington Ave., New York 17, N. Y. President: E. K. Stevens.

Dec. 4-6, American Institute of Mining, Metallurgical & Petroleum Engineers: Electric furnace steel conference, William Penn Hotel, Pittsburgh. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Dec. 4-6, Building Research Institute: Conference on adhesives and sealants in building, Shoreham Hotel, Washington. Institute's address: 2101 Constitution Ave., Washington 25, D. C. Executive director: William H. Scheick.

Dec. 5-7, National Association of Manufacturers: Congress of American Industry, Waldorf-Astoria Hotel, New York. Association's address: 14 W. 49th St., New York 20, N. Y. Managing director: Kenneth R. Miller.

Dec. 10-11, Society of the Plastics Industry Inc.: Conference on vinyl products in the consumer field, Hotel Commodore, New York. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

Dec. 11-12, National Construction Industries Conference: Hotel Sherman, Chicago. Sponsor: Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

1958

Jan. 6-8, Southern Industrial Distributors' Association: Midyear meeting, Roosevelt Hotel, New Orleans. Association's address: 1626 Fulton National Bank Bldg., Atlanta 3, Ga. Secretary: E. L. Pugh.

Jan. 16-17, National Industrial Conference Board Inc.: General session for all associates, Hotel Commodore, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

fluxstone? . . . or
steel user's friend?

Both—if it's fluxstone from Chemstone Corporation.

Even though quarrying and processing millions of tons, Chemstone never loses sight of the fluxstone characteristics that make good steel . . . purity, hardness, size uniformity, specification adherence, low sulfur content, and solubility.

These spell out the *quality* needed to make the steels that meet today's toughest forming and fabricating requirements.

Beyond quality, you have Chemstone's time-honored record of dependable deliveries, skilled technical help and research support. The total? A supplier that will back up your fluxstone needs to the full. Your inquiry is invited.

WORLD'S LARGEST NON-CAPTIVE FLUXSTONE PRODUCER

Chemstone CORPORATION

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a subsidiary of
MINERALS & CHEMICALS
CORPORATION OF AMERICA

Pittsburgh, Pa. Representative:
NEVILLE LIME COMPANY
Oliver Building

The "RIGHT COMBINATION" for every reinforced grinding wheel

...because Norton builds in the "Touch of Gold"

In the complete line of Norton reinforced wheels you get the size, abrasive, reinforcing web and rubber or resinoid bond best suited to your work. These wheels bring you better production at lower costs . . . *because Norton builds in strength and safety that add the profit-boosting "Touch of Gold".*

In the many varieties of Norton reinforced wheels you'll find the just-right "combinations" that let you work fastest, safest, most profitably . . . your big advantages in dealing with the world's largest supplier of abrasives.

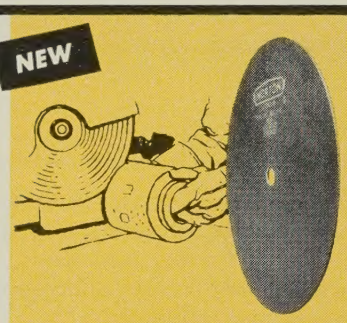
Also, Reinforced Mounted Wheels and Sticks

See your Norton distributor for further facts about reinforced abrasive products. Ask him for booklet No. 1748. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

RN WHEELS
Glass Cloth

NEW

New — for the foundry and lower priced! Norton has been field-testing a new rubber-bonded-reinforced wheel. It's ready now and well worth your investigation for savings in your cutting-off operations on ferrous and non-ferrous metals.



BFR WHEELS
Cotton-Nylon

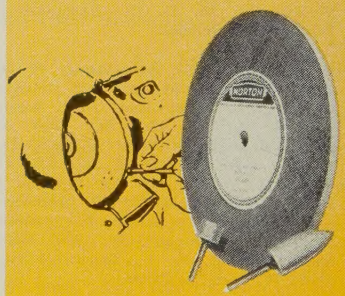
Top performers for light, portable grinding. These semi-flexible resinoid wheels have cotton fabric with an additional layer of Nylon for added safety. Specify A24KBFR for weld smoothing, removing scale, light finishing, minor cut-off jobs, etc.

BN WHEELS
Glass Cloth

Ten-inch diameter wheels can now be had 1/16" and 3/32" thick. In this range specify A36TBN. For heavy duty work, requiring larger, thicker wheels, specify A24R14BN. Use them for slotting, for cutting-off non-ferrous metals, wire rope, many non-metallic materials.

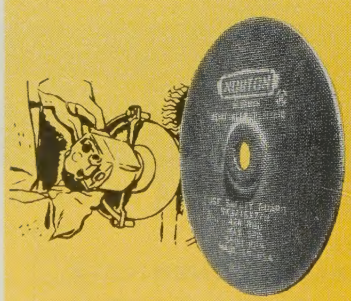
BF WHEELS
Cotton

These resinoid straight wheels with cotton fabric reinforcement are "the right combination" for peripheral grinding, do a fine job of deburring and finishing. Fine for blending and smoothing light welds. Also available in mounted wheels and sticks.



BD WHEELS
Glass-Nylon

For fastest cutting on right-angle grinders you'll want the glass cloth reinforced resinoid bonded hub wheels of rigid type. Use for medium to heavy weld grinding and smoothing flame-cut edges. Specify A24NBD for fast cut, A24QBD for long life. For cutting-off, A24RBD which is Nylon reinforced.



W-1811

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Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION:
Coated Abrasives • Sharpening Stones • Behr-cat Tapes

STEEL
November 18, 1957

Metalworking Outlook

Escalators Running Wild?

The steel industry's wage costs will go up another 4 cents per man per hour on Jan. 1 if the consumer price index stays at its present 121.1 per cent of the 1947-49 average. Since the 1956 steel contract was signed, 7 cents have already been added to hourly earnings because of escalation, far more than management had expected. The situation is making a new contract gimmick more popular with management—a limit on the amount of increase (or decrease) allowed each year by an escalator clause. Two contracts with a 3-cent limit have been negotiated recently in Cleveland; a few other examples around the country have limits of 3 to 5 cents on the increase (or decrease) permitted in a year, regardless of what the index does.

Short Week: UAW's Version

Here's how the United Auto Workers will present its short week demand to the auto companies next spring: Start premium pay after 32 weekly hours, not the present 40. To its members, the UAW will soft-pedal the possibility of reduced hours, having discovered they are not enthusiastic about less work time. Instead, it will plug the fact that a 40-hour week, with overtime beginning at 32 hours, would boost earnings 10 per cent even if the base pay remains the same. Possible compromise: Premium hours to start after 36 or 38.

Pay Boost Outlook for '58

Look for the negotiated average wage increase to hit about 8 cents next year. Associated Industries of Cleveland reports that the average hourly boost in the bellwether northern Ohio area will be 7.3 cents this year, compared with 7.5 cents in 1956, 8.5 cents in 1955, 5 cents in 1954, and 7 cents in 1953.

No Alarm About Excess Capacity

For the moment, we have excess capacity in many metalworking areas, but STEEL finds little management concern about it. On the contrary, many executives consider it insurance for the expected boom of the 1960s. In 1957, the steel industry will turn out about 115 million ingot tons, 85 per cent of its 133.5 million tons of capacity. The same production next year would be 81 per cent of 141 million tons of capacity. We'll operate at 80 to 85 per cent of capacity in the auto industry this year and next. The machine tool industry is producing at about 80 per cent of all-out capacity this year, may drop to 70 per cent next year.

Plans for Lackawanna

The world's third largest steel plant, Bethlehem Steel Co.'s Lackawanna facility at Buffalo, continues to produce at about 90 per cent of capacity, far ahead of the national average. "It has one of the greatest potentials

Technical Outlook—Page 151
Market Outlook—Page 241

of any steel plant," says Bethlehem's president, Arthur B. Homer, because of its position on the Great Lakes and the coming influence of the St. Lawrence Seaway. "On ice," he says, is still another expansion plan for the facility, which will be thawed out when economic temperatures are right.

Price Prospects in Electrical Industry

The electrical industry must face the economic facts of life and receive "fair prices for its products," says Mark W. Cresap Jr., Westinghouse Electric Corp.'s executive vice president. The industry's problems are signaled by a 25 per cent decline in return on stockholder's equity over the last five years. Since 1952, he adds, steel prices have risen 9 percentage points more than electrical equipment; home appliances declined 2 per cent, while autos increased 13 per cent.

U.S. Industry Needs To 'Power Up'

American factories must boost the capacity of their electrical systems before they can automate operations enough to produce for a growing population, says A. C. Monteith, Westinghouse vice president for apparatus products. A survey of 550 important industrial plants showed that the heavy majority had inadequate electrical equipment to handle the power loads needed in the next ten years. Basis: Demand for goods is expected to be 40 per cent above today's.

Traffic Strangling the Auto?

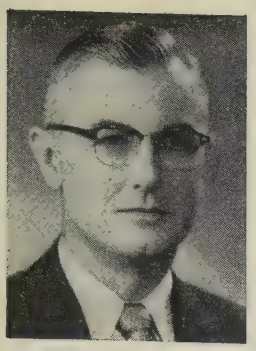
"Something might be done to the size of our cars to ease traffic congestion," says Reginald J. Pigott, former director of engineering, Gulf Research & Development Co. He believes: "It may be necessary ultimately to bar personal cars from city streets. Public transportation within the city itself will have to be furnished almost entirely by subways and taxis."

More Mobile Homes Hit the Road

Production of mobile homes (trailers) will hit a record of at least 150,000 units this year. They'll be worth more than $600 million. Last year, 140,000, valued at more than $575 million, were built. As recently as 1950, only 63,000, worth $216 million, were built, says National Credit Office.

Straws in the Wind

Some 2500 miles of the interstate highway network, costing $1.3 billion, have been completed or are in the works this year . . . Harvey Aluminum Co. will prospect for bauxite in Jamaica . . . American Metal Co. Ltd. will merge with Climax Molybdenum Co., to become American Metal Climax Inc. . . . "Reliable sources indicate material handling equipment sales will be up 5 to 6 per cent in 1958," says Material Handling Institute Inc.



1958—Year of the Marketeer

We have been checking the early returns to this magazine's annual survey of what metalworking executives expect in the year ahead.

A few are extremely optimistic. They expect the boom of 1955-56 to continue or accelerate.

A few are extremely pessimistic. They predict sharp downturns in volume and profits.

The overwhelming majority expect a year similar to 1957. Some believe it'll be a little better. Some think it will be a little worse. Most believe competition will be tougher because of expanded production capacity. Many see the squeeze on profits tightening.

But most respondents see plenty of opportunities for aggressive companies to show a satisfactory volume and profit. One says we are on a Prosperity Plateau.

Respondents' plans to hold or improve their profit position are even more interesting than their expectations of business activity. They run the gamut of management and production reforms. We are impressed by the number who are emphasizing marketing.

The metalworking industry has been nibbling around the edges of the new concept of marketing for several years. While it has been wholeheartedly embraced by some progressive companies, it has been viewed with suspicion and approached with hesitancy by most.

Now that the accent is off production and expansion, more executives are showing a greater interest in marketing. They shun the fancy terms that so often surround—and possibly becloud—marketing.

They simply say they intend to:

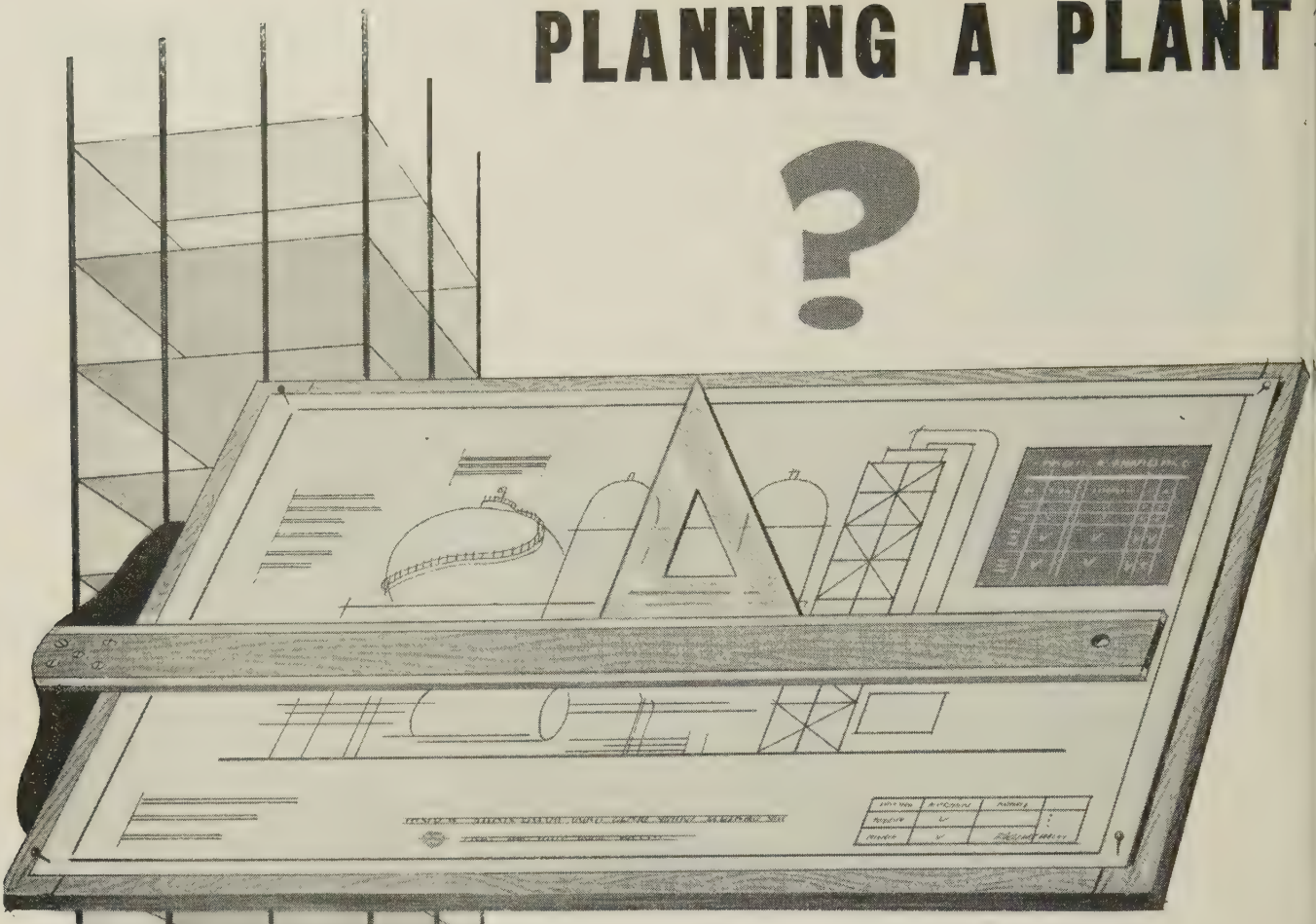
1. Integrate all functions involved in moving goods to the consumer.
2. Bring the marketing man into the product planning picture at the beginning rather than at the end of the production cycle.
3. Charge the marketing department with responsibility for profitability as well as volume.
4. Become more closely attuned to the wants of the customer.

No doubt about it, the metalworking industry is counting on modern marketing to increase its profit power in 1958.

Walter J Campbell

EDITOR

PLANNING A PLANT ?

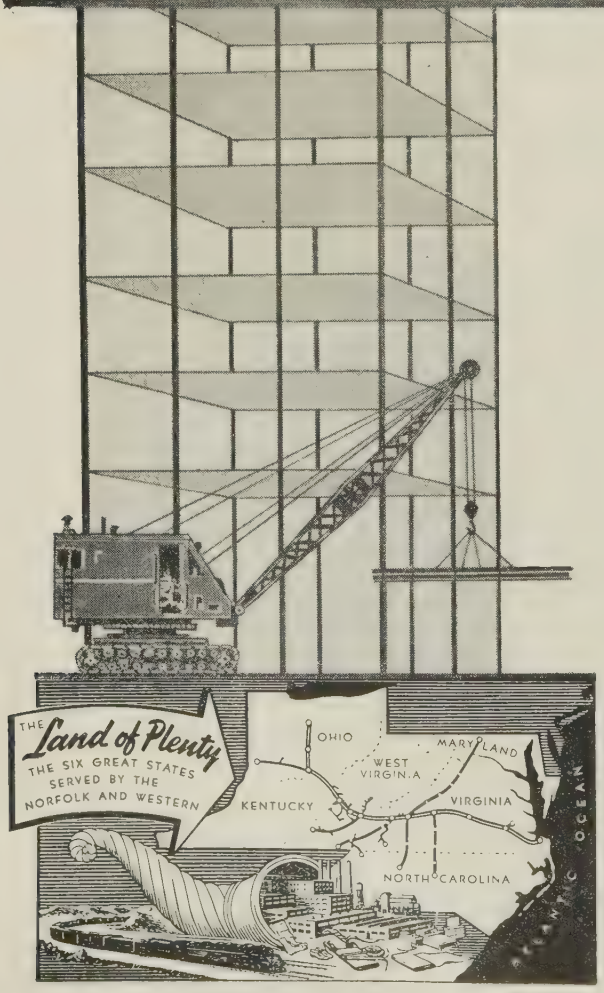


You can't afford to settle for less than you need in your new plant site. If you have been looking and haven't found what you want, look next at The Land of Plenty.

Here, you may find just what you need — vast stores of raw materials, accessibility to markets, good power and water, dependable transportation. Workers are plentiful and *home-rooted.* Tax rates are fair. Communities are clean and progressive. Add the fine Port of Norfolk on famed Hampton Roads, fair real estate values, and a host of other industrial advantages, and you will understand why 255 new plants have located here in the last four years alone.

Get all the facts about this progressive area.

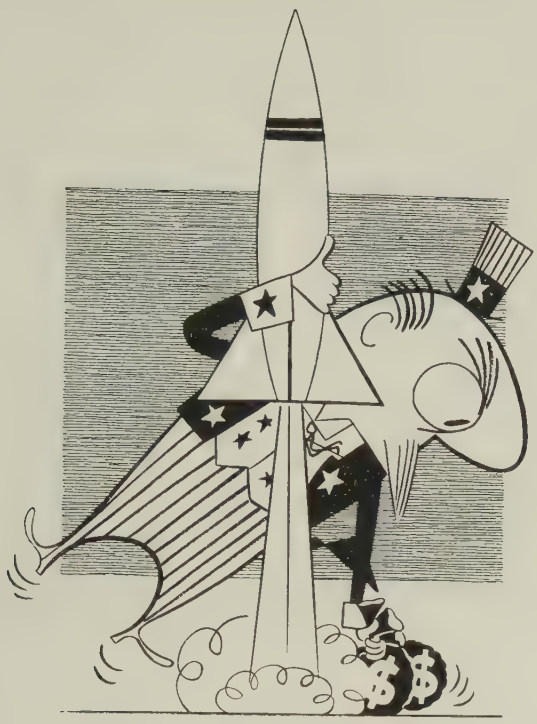
Trained Norfolk and Western plant location specialists will be glad to help you find the site you need. They'll work with you quickly, quietly, confidentially, and without obligation.



Write, Wire or Call—

L. E. Ward, Jr., Manager
Industrial and Agricultural Department
Drawer S-788 (Phone Diamond 4-1451, Ext. 474)
Norfolk and Western Railway
Roanoke, Virginia

Norfolk and Western RAILWAY



To fly high with missiles . . .

Will U.S. Dump the Budget?

TODAY (Nov. 18) on Capitol Hill, five legislators begin hearings on the relation between government spending and economic growth. The members of the Joint Economic Committee's Fiscal Policy Subcommittee will hear from about 100 industrial, labor, and government economists.

At the other end of Pennsylvania Avenue, President Eisenhower continues talks with his cabinet, the National Security Council, the Bureau of the Budget, and various scientific advisers on the best means to take the lead in missile development from Russia.

Basic Question—The Fiscal Policy Subcommittee, headed by Rep. Wilbur Mills (D., Ark.), will provide leadership for the next session of Congress, which is certain to hear demands from many for a big boost in spending by the Defense Department. The administration has yet to admit that more dollars are needed for missiles, although Sen. Styles Bridges (R., N. H.) a leader of the economy bloc, intimates $1 billion to $2 billion might be added to Defense's fiscal 1959 spending budget.

Missile enthusiasts on Capitol Hill and at the Pentagon claim $2 billion would merely handle inflated defense costs from fiscal 1958 to fiscal 1959. Some budget analysts figure we'll need Senator Bridges' $2 billion plus another $4 billion in authorized funds to make up for old money previously authorized during Korea and now drying up. While Congress has been cutting Defense's appropriations every year since Korea, Defense has not been cutting its spending as fast because it could rely on the old money.

Here's what Ike wants to hear from his budget and science people and what Representative Mills hopes to learn from the economists: Can we afford increased defense spending? How badly is it needed?

Congress Will Learn—Chances are that Ike will decide we don't need much more money. Defense tried to hold off the missile investigation scheduled to begin Nov. 25 by Sen. Lyndon Johnson's (D., Tex.) Preparedness Investigation Subcommittee, but after a 7-hour briefing at the Pentagon, Senator Johnson announced he would go ahead because he believed a "bold, new approach" to missiles and satellities was needed.

Congress gave Defense almost all the money it asked for this year to develop and build missiles. The Navy's Vanguard project for a satellite has never been denied any money it wanted.

Ike's approach appears to be that a healthy reorganization of our science policies will solve our troubles. Thus far, he is backed by such leading business groups as the National Association of Manufacturers and the U. S. Chamber of Commerce.

So don't look for any greatly increased defense budget from the administration. It will only come from Congress next session, if at all. Hint of the Congressional temper: Sen. Homer Capehart (R., Ind.) wants standby control authority enacted for wages and prices.

Is defense sound? Here's what leading economists will tell Representative Mills about the relation between defense spending and a sound economy:

1. If increased spending is paid for out of taxes, as during Korea, the good and bad effects on the civilian economy tend to balance each other out. 2. Defense spending amounting to 10 per cent of the gross national product does not appear to be harmful to the economy. 3. Defense spending contributes more than its share to the economy by stimulating new civilian products. 4. With no increased defense spending to further stimulate inflation, the prices of defense items should turn down by the middle of 1958. 5. Just as a cut in the defense budget does not guarantee a more efficient Defense Department, so a boost in defense spending will not guarantee a proportionate gain in our ability to defend ourselves.

The Debt Ceiling—By law, the

U. S. Government cannot go over a debt ceiling of $275 billion. As of Oct. 31, the public debt was $273.7 billion, with the Treasury Department scheduled to come closer to the ceiling as revenues fall off until income tax payments start in the first quarter of 1958.

There is no assurance from the Budget Bureau that we won't have to exceed the ceiling, even without increased defense spending. Reports from reliable sources say the administration is preparing to ask Congress for a temporary hike in the ceiling.

Defense Department spending is running at an annual rate of $38.4 billion. With no change, the Treasury will have a surplus at the end of fiscal 1958 of about $1 billion.

Consensus: Tax cuts in 1958 are out. Indeed, if either the administration or Congress pushes through a missile spending program designed to catch the Russians fast and in quantity, a tax hike would be necessary to avoid deficit financing in fiscal 1959, unless other government spending were drastically curtailed.

Buys Missile Site

Hughes Aircraft Co. purchased 430 acres of Sunny Hill Ranch near Fullerton, Calif., as a site for a $6-million guided missile plant.

Ryan Again Adds Space

Ryan Aeronautical Co. will add three buildings (total floor space 140,400 sq ft) to its Torrance, Calif., division.

Last May it acquired 137,000 sq ft for the assembly of Firebee target drone missiles. Other recent expansions include: 130,000 sq ft of manufacturing and administrative space in San Diego and the leasing of a 30,000 sq-ft building on Kearney Mesa from Magnatron Corp. of America.

The new assembly area, to be completed in four months, will be used for Firebee production and Ryan's work on the Douglas DC-8 jet engine "power packs" and pylon assemblies.

Carter Construction Co., Los Angeles, will build the $814,000 structures, including a 180 x 400 ft assembly building; a 180 x 220 ft shipping, receiving, tooling, and repair building; and a two-story, 60 x 240 ft office building.

The workforce at Torrance will be enlarged from 400 to about 1000 next summer; early in 1959 it is expected to reach about 1700.

Kaiser Boosts Pipe Output

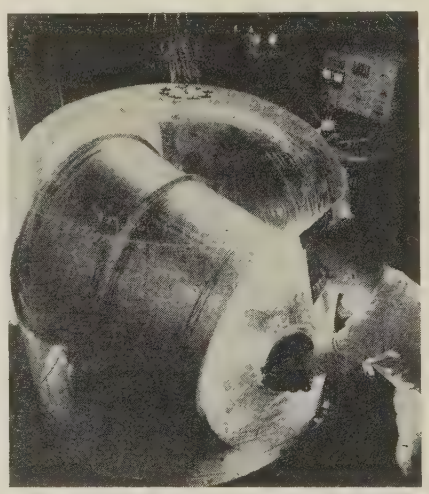
Kaiser Steel Corp.'s Fabricating Div. is spending $2 million to double the pipemaking capacity of its Napa, Calif., plant (see STEEL, July 1, p. 28). Major product will be line pipe for petroleum and gas transmission.

Facilities under construction include a 50,000 sq-ft plant addition (to house welding, facing, and testing facilities), new supplementary buildings, and more handling and storage areas. With the new facilities, the plant will produce pipe up to 42 in. in diameter. The expansion is in addition to Kaiser's $194-million West Coast program (STEEL, July 29, p. 165).

Glass Plant for 1959

Pittsburgh Plate Glass Co., Pittsburgh, will begin construction next March on a multimillion dollar plant. Start was originally scheduled for the fall of 1955.

The five-story structure will go up on an 80-acre site about four miles southeast of Decatur, Ill. When completed in the spring of 1959, the 450,000 sq-ft plant will employ 350 persons. Initial facilities will include one glass tank and four Pennvernon drawing machines.



Plastic Tent Aids Welding

By welding a titanium compressor case in an argon-filled tent, Pratt & Whitney Aircraft worker hopes to eliminate impurities that occur when the metal is welded in oxygen. Sleeves with attached gloves are built into tent, and work is viewed through shield which filters glare. In welding steel, helium is substituted for argon. Tent material is Bakelite Co.'s Krene cast vinyl film

B&W Adds Electric Furnace

Babcock & Wilcox Co.'s tubular products division, Beaver Falls, Pa., will add a new electric arc furnace (the fifth one) and associated equipment to its alloy and stainless steelmaking facilities. Estimated cost: Between $12 million and $14 million.

The new unit will produce bars and blooms for the division's tube-making and extrusion operations. Completion is scheduled for late 1959. Manpower requirements at full operation are estimated at 200

More Bricks from Porter

H. K. Porter Company Inc. will break ground within 60 days for a new tunnel kiln refractories plant at Bessemer, Ala. Scheduled for completion in the fall of 1958, the new unit will use present clay grinding and batching facilities. Faster delivery will be offered because of a shorter burning cycle. New material handling equipment and brickmaking machinery also is included in the $1 million program.

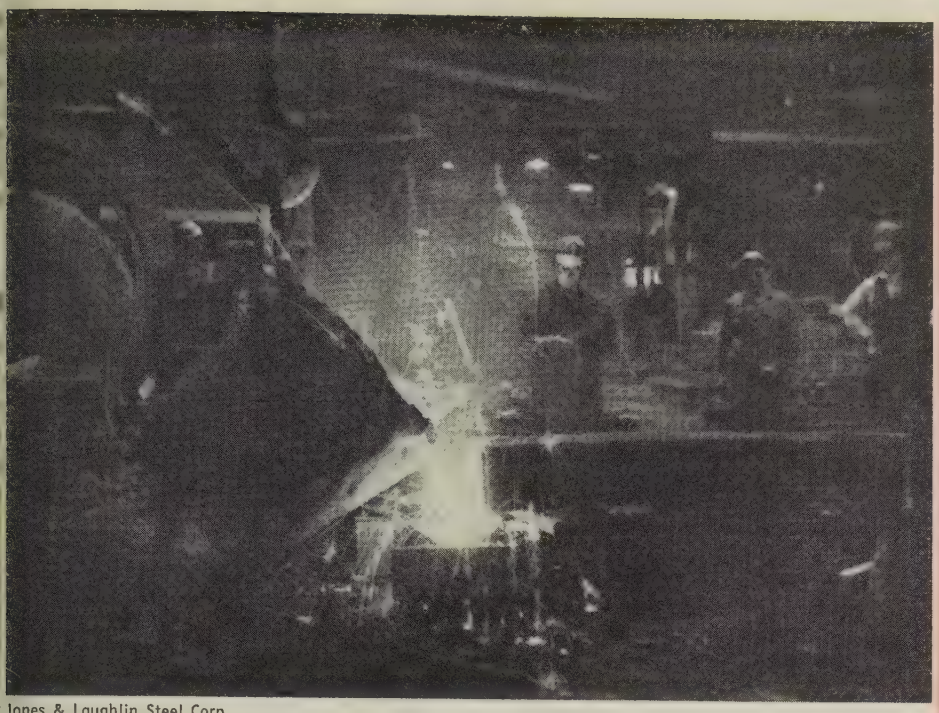
Opens Custom Flux Plant

Arcflux Corp., Philadelphia, a subsidiary of Arcos Corp., is opening a new 15,000 sq-ft plant to double production of stainless steel and submerged arc welding fluxes for low alloy steel.

Facilities are being installed for testing submerged arc welding equipment under simulated field conditions, using customer materials. The firm will compound fluxes to specific customer needs.

Expansion About Finished

Morrison Products Inc., Cleveland, manufacturer of blower equipment, has nearly completed its four-year, $750,000 expansion program. An addition to the plant houses a shear room and a warehouse.



Jones & Laughlin Steel Corp.

Steel Casting Summary

Prices: Up 6 per cent.
Backlogs: Down 20 per cent.
Workload: 70 per cent of capacity.
Hours: 40 per week.
1958: Not as good as 1957.
Main market: Railroads.

Trends

Better marketing methods.
More engineering service.
Shipping longer distances.
Faster deliveries.
Improved material handling.
Emphasis on sand reclamation.
More vacuum melting.
Higher strength castings.
Casting to closer tolerances.

Shipments

1958*	1,700,000 tons
1957*	1,825,000 "
1956	1,931,987 "
1955	1,530,694 "
1954	1,184,096 "
1953	1,834,197 "
1952	1,925,203 "
1951	2,050,054 "

Source: Bureau of the Census.
*Estimated by STEEL.

Steel Casting Orders Drop

STILL running along under a full head of steam, steel foundries are beginning to wonder how long it will last.

Since August, 1956, shipments have exceeded bookings. Backlogs have been reduced 20 per cent, from 586,496 tons to 471,190. Few orders have been written since June, and there's little likelihood of a fourth quarter pickup.

Good Year—Despite their concern for immediate prospects, foundrymen are satisfied with over-all results for 1957. For the first eight months, shipments from independent and captive foundries were down only 3.5 per cent from last year's level. Since prices are about 6 per cent higher this year, dollar volume will approach the record level of 1956 ($950 million).

F. Kermit Donaldson, executive vice president of the Steel Founders' Society of America, Cleveland, estimates that shipments of member foundries were down 8 per cent in the first eight months. He points out that reduced spending for capital equipment has hurt independents more than captives. While he expects a further drop in shipments during the final quarter, he describes 1957 as a good year (see the table).

Profit Squeeze—Although shipments are holding up pretty well, profits are generally lower. A Michigan foundry has been able to raise its prices only 5 per cent, despite a 12 per cent increase in costs. Says a large Chicago producer: "Labor costs went up 5 per cent on Sept. 1, and we couldn't adjust our prices fast enough to compensate. Because of a stretch-out in release dates, we're shipping most of our castings at prices quoted in the spring."

In some cases, the profit squeeze results from reduced volume. It is particularly true when foundries rely on sales to a single industry. The firms that supply manufacturers of rolling mill machinery, oil field apparatus, and earth moving equipment have been hard hit by decisions of buyers to liquidate inventories.

Markets—The society's analysis of the distribution of steel castings shows that 39.7 per cent of shipments go into railroad equipment; 8.6 per cent go into rolling mills; 8.5 per cent into power shovels and road building machinery; 7.8 per cent into ordnance; 7.3 per cent into metalworking and other machinery; 6.2 per cent into valves, piping, fittings, and pumps; 4.7 per cent into mining and crushing machinery; 4.5 per cent into power equipment; 4.5 per cent into automotive products (trucks and trailers); 3.5 per cent into agricultural implements; 1.4 per cent into material handling equipment; 1.3 per cent into shipbuilding; and 2.0 per cent into all other industries.

While most foundries that are heavily involved in railroad business did well in the first half, many now complain that freight car builders "just aren't buying" (see Page 120). Bertram A. Kline,

sales manager for Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., says shipments are holding up only because of a backlog. General Steel Castings Corp., Granite City, Ill., reports that it has started shipment of an armor order (castings for Chrysler Corp.'s M48 medium tank) to take up some of the slack in railroad specialties.

In general, diversified foundries have fared better than those which depend on orders from one or two industries. Case in point: Ross-Meehan Foundries, Chattanooga, Tenn., which makes precision castings for producers of machine tools, oil refinery equipment, pressure valves, armor, freight cars, aircraft, and textile machinery. Says the firm's president, J. C. Lucas: "We've been operating 24 hours a day, six days a week, since the first of the year. Shipments are up 22 to 24 per cent." Mr. Lucas sells throughout the Southeast and in New York, Illinois, Texas, and California. He attributes his firm's success to aggressive sales efforts (four engineers in the field at all times) and to quality production.

New Technology—Mr. Donaldson sees a bright future for steel foundries. He predicts: 1. The industry will soon perfect ultrahigh strength castings. 2. Improved molding methods will permit casting to closer tolerances and reduce machining. 3. Castings will compete effectively against forgings in terms of surface finish, tolerances, lower machining costs, and greater design freedom.

Outlook for 1958—Foundrymen think next year's business will be good, but probably below the 1957 level. Reason: Greatly reduced freight car backlogs. Chances for a midyear pickup depend heavily on federal highway construction.

Considers Major Expansion

Curtiss-Wright Corp.'s Metals Processing Div., Buffalo, is contemplating a $10-million expansion program, largely for additional extrusion facilities.

It is predicting a much greater demand for heavy alloy, stainless steel pipe, which it now sells to the government and the electric utility and chemical industries.

This clinic helped solve a foundry's scrap problem as . . .

Methods Analysis Pays Off

USING ONLY its own staff, Electric Steel Foundry Co., Portland, Oreg., reduced scrap from off-analysis heats 60 per cent in three months. The firm produces a wide variety of high alloy steel castings, requiring precise alloy ratios.

Off-analysis heats had become a major problem. Here's how it was solved:

Planned Approach — A project head was appointed and a three-phase program devised:

1. The whole operation was analyzed, step by step, making immediate improvements where the need was obvious and the cost was nominal. 2. Group conferences with key supervisory personnel brought out more ideas for improvements. 3. A training program increased efficiency and reduced human error.

Investigation — Job breakdowns of each step in the process—calculating the heat, making up the heat log, making up the charge, and melting and refining—were made by the project head.

All scrapped heats of the previous 15 months were analyzed; reasons for off-analysis were tabulated and studied.

Conferences — Nine men — foremen, metallurgists, chemists, and technicians—met weekly for over two months to study the process thoroughly, using the job breakdowns as a base. A flow process chart of all paperwork was made to show chances of error in that area. The group found "hundreds," states Harold Gowing, director of public relations. "So many manual checking operations had been in use that the process had become ineffective."

Conclusion of the meetings: The whole system had to be changed. Brainstorming sessions (see STEEL,

Apr. 23, 1956, p. 105) brought to light many ideas for solutions.

Study—The nine men evaluated the ideas in three categories—paperwork, making up the heat, and melting. In the paperwork sessions, all forms were checked and revised to eliminate duplication and reduce chances for error. A girl was hired to do calculating work, releasing control men for closer heat follow-up. A score sheet was set up to record the reasons for off-analysis heats, show where they happened, why, and who was responsible.

In "making-up-the-heat" sessions, these ideas were considered worthwhile: 1. Establish a central heat makeup area. 2. Install print-weight scales. 3. Install carriers to keep all ingredients together. 4. Build plainly marked alloy bins to hold a week's supply. 5. Install racks to hold returns where they'd be readily accessible.

Training—A course with a threefold purpose was established: 1. Train each worker on all phases of his job. 2. Show him the details of related functions. 3. Show him how operations dovetail.

Seven of the nine men were made instructors; each conducted sessions in his operation. He prepared his own text material, props, and visual aids. Three-hour sessions were held on seven Saturday mornings, on company time, with 20 workmen in a class. A discussion period wound up each session.

Tangible Results — After three months, scrap was cut down by 60 per cent. The improvement has been maintained. Score sheets are on display, and each deviation is checked to find more ways to reduce scrap.

A heat makeup area and a direct - reading spectrograph have been installed; material handling has improved. Off-analysis heats are caught before they're poured in expensive molds.

Intangible Results—All workmen helped solve the problem. After the training course, many wanted additional foundry knowledge. So ESCO arranged for a junior college to hold night classes. Over 70 workmen participated at their own expense.

Says Mr. Gowing: "We're especially pleased with this program because we did it all ourselves."

California Booms

It accounts for 40 per cent of steel production in the Western District, AISI told

BOOMING California has increased its steel production 280 per cent since 1940. The national figure is only 72 per cent.

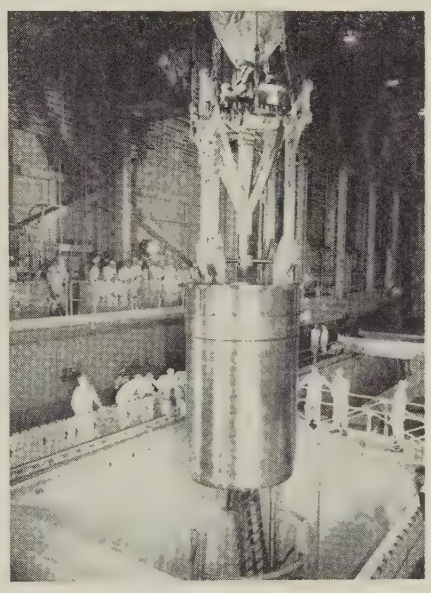
Max D. Howell, executive vice president of the American Iron & Steel Institute, told a regional technical meeting in San Francisco that the state turns out 40 per cent (about 3 million tons this year) of steel produced in the Western District, which will have an output of about 7 million net tons of ingots this year.

"All the elements of a full life are manifest here," Mr. Howell said. "Anxious to share in these advantages, people from other states are coming here to reside at the rate of about 1000 a day."

More Adventure—Morrough P. O'Brien, dean of the College of Engineering, University of California, told the meeting that industry is badly in need of more basic research "pursued as an adventure, by men who give little thought to its practical significance."

He said that only $240 million out of $9.4 billion spent for research in the U. S. this year will be used in basic investigations. Without more basic work, Mr. O'Brien added, applied research "is in danger of stagnation."

Poor communications between management and research specialists, he believes, "cause the failure of many worthwhile projects and increase the cost of development work by a factor of two, possibly more," he said.



Atom Fuel In Powerplant

Nuclear core weighing 58 tons is lowered into position at the nation's first full scale, atomic-electric generating station, Shippingport, Pa. Fuel charge contains more than 14 tons of uranium. Container is lined with ¼-in. stainless steel. A joint project of the AEC and Duquesne Light Co., the plant will serve Pittsburgh area industry and homes. Westinghouse built the reactor and a 100,000-kw turbine generator

Pensioners Multiply

More than half of nation's 15 million people over 65 now get OASI payments

OVER HALF the nation's elders receive checks from the Bureau of Old-Age and Survivors Insurance. In 1948, only one-eighth of them participated.

While the older segment of the population increased by 3.5 million during the period, government pensioners increased twice that amount. The figure for persons with income from employment or public assistance is the same as it was in 1948.

The Winners—Pensioners who had no income or income only from such sources as annuities were helped the most. Their ranks decreased from over 3 million in 1948 to less than 1 million. They make up only 5 per cent of the older population group, versus 29 per cent in 1948.

The work force has proportionately fewer oldsters than it did at the end of World War II, but there has been a substantial increase in the percentage with income and in the average amount they receive, says the National Industrial Conference Board.

To Quadruple Area

The American Radiator & Standard Sanitary Corp.'s Ross Heat Exchanger Div. is planning another multimililon dollar expansion. It will quadruple the size of its Cheektowaga, N. Y., plant within the next five years.

Case Tech dean tells how industry can . . .

Help Improve Engineering Education

1. **Initiate** programs to get good math and science teachers in high schools. Du Pont offers them financial support. General Electric and National Science Foundation pay their expenses for a six-week graduate program in math, physics, or chemistry at Case. New developments are emphasized.

2. **Via your company publication,** emphasize the importance of math and science courses to help employees guide the education of their children.

3. **When recruiting,** don't discourage teaching careers. Rather, through institutional advertising or other programs, encourage top quality people to become teachers; you need a good climate to grow good corn.

4. **Continue financial aid programs** (scholarships, grants for operating expenses, capital gifts). Or you may want to consider giving a school funds earmarked for experimentation in new teaching methods. Present engineering curriculums don't provide a broad enough base.

5. **Hire undergraduates** during their vacations. Chances are you'll both benefit.

6. **Hire professors** for summer work. Better still, bring them in for a year or two while "on leave" from school. Show them your new methods. Let them help solve your problems. Their students will benefit.

7. **Encourage** your engineers to teach for a year or two. They'll learn at the same time. So will their students.

8. **Advocate** graduate work. You may want to pay the school the actual cost of the course rather than only the standard fee.

9. **Sometimes,** trading personnel with a college can be advantageous.

Source: Karl B. McEachron Jr., dean of instruction, Case Institute of Technology.

Needed: Better Training

THE TRAINING engineering students are receiving in colleges and universities is "completely unsuited and inadequate to prepare them for their on-the-job responsibilities," says the American Society of Tool Engineers.

It adds: One out of three M.E. and I.E. graduates is assigned to manufacturing engineering responsibilities, but few schools offer courses in the field.

Of 142 engineering schools surveyed in 1953, the ASTE notes that only 36 offered 25 or more credit hours in tool and production engineering, and several offered none.

Industry Survey—ASTE recently surveyed 1050 metalworking companies to determine job responsibilities of recent graduates. The results:

- Manufacturing . . 37 per cent
- Design & Development . . . . . 33.1 per cent
- Sales . . . . . 14.2 per cent
- Research . . . . . 8.9 per cent

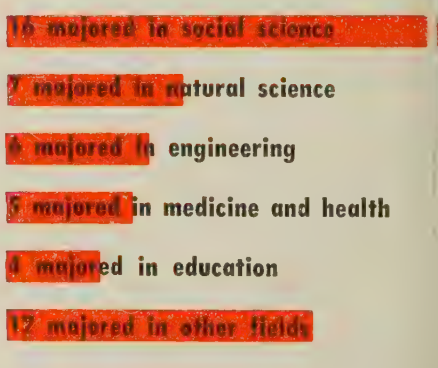
Alumni Survey—ASTE also surveyed the '50, '51, and '52 M.E. and I.E. graduates of five large universities — Lehigh, Michigan, Purdue, Tennessee, and Texas—and discovered that 25.5 per cent work in manufacturing. In each case more work in manufacturing than in any other engineering function. The remainder are distributed:

- 17 per cent in product design.
- 12.5 per cent in sales.
- 10.9 per cent in research.
- 8.7 per cent in maintenance.
- 8.6 per cent in administration.

Heat-power work, a traditional academic favorite, lags far behind with 5.5 per cent.

Russia Leads—All Russian high school graduates have four years of chemistry; less than one-third of U. S. students have one year. Russian children get more instruction in ten years than Americans do in 12.

Ratio Is Low—Due to a growing population and a higher rate of college entrance, about 10 per cent of our young people graduate from college. But not enough of them are in science and engineering. Of every 50 male graduates in 1955 . . .



Less than 1 per cent of female graduates majored in engineering and only 6 per cent majored in natural science.

The National Science Foundation estimates that 950,000 engineers will be needed by industry in 1960 and 1,550,000 will be needed in 1970. Teaching positions will more than double.

But some signs point to an easing in the shortage: 1. Engineers' salaries rose less in the year ended

June, 1957, than in the previous year. 2. Colleges report less recruiting activity, and, in some cases, lower starting salaries being offered.

The problem now seems to be one of quality rather than quantity.

What To Do—Engineers can get better training. The checklist at the top of Page 114 points out some ways; there are others. You should . . .

1. Hire only as many engineers as you can effectively use (see STEEL, Sept. 2, pp. 98-99). Notes Dr. Lawrence R. Hafstad, General Motors' vice president in charge of research: "Bottlenecks, really due to lack of scientific knowledge, are often attacked by regiments of engineers at great cost and result in frustration."

2. Initiate a good on-the-job training program. The Engineering Society of Detroit says it should include:

- Participating in conferences on regular problems.
- Assisting in engineering calculations and independently undertaking minor problems.
- Taking part in planning, design, production, or operating problems, first as a helper, then independently.
- Working in research and development under close supervision.
- Gathering information in regard to such things as troubles, failures, and complaints; analyzing the data; and proposing possible solutions.
- Operating equipment or systems after instruction and under supervision.
- Assisting field engineer on construction or maintenance work.
- Doing outside reading in finance, labor relations, English, and economics (or other subjects depending upon company and specialty).

3. Closely follow each engineer's progress to be sure that he's getting the training, he's satisfied and interested, and his potential is recognized by his supervisors. Keep a record of his progress.

4. Use technicians, machines, and scheduling (see STEEL, June 15, pp. 64-65).

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

Shortage Continues

ENGINEERS capable of working in the electronic, rocket, and missile fields will remain in great demand during the next three years, concludes a survey by Deutsch & Shea Inc., technical manpower consultants.

Demand will be greatest for aeronautical, electrical, and mechanical engineers, though chemical, metallurgical, and industrial engineers will find plenty of jobs. There will be no serious shortage of civil or mining engineers.

Reason — Engineering employment rose 44 per cent in the last seven years, while total employment rose only 13 per cent. The manner, rather than amount, of expansion in our economy explains the skyrocketing demand.

Causes—The pattern of economic growth was marked by three developments:

- Research and development expenditures rose from $2.87 billion in 1950 to $6.5 billion in 1956.
- Plant and equipment expenditures rose from $20.6 billion in 1950 to about $35.1 billion in 1957.
- The index of industrial capacity jumped more than 100 per cent for industries which are primary employers of engineers, compared with only 65 per cent for all manufacturing industries.

Results—The shortage of engineers has caused: 1. Hoarding of engineers. 2. Some curtailment of research. 3. Lofty starting salaries. 4. Inadequate training. 5. Nongrads holding engineering jobs.

Of entrants to the engineering profession in the last seven years, only 64 per cent were engineering graduates. Grads in other fields accounted for 7 per cent; nongraduates made up 25 per cent, former engineers 4 per cent.

Good results were obtained. Many firms now utilize their engineers better (though there's still much room for improvement).

Solution—Industry must: 1. Improve engineers' productivity. 2. Set up good on-the-job training programs. 3. Help colleges and universities accelerate and improve their educational programs to meet current and future demands.

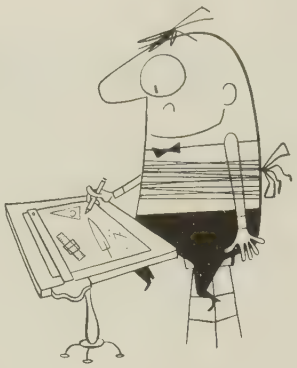
In the market for engineers . . .

Demand Still Outruns Supply

	Supply		Increase	Distribution	Shortage
	1960	1957	1957-1960	1960	1960
All Fields	877,423	771,608	13.7%	100.0%	72,577
Aeronautical	28,789	24,980	15.2	3.3	pressing
Chemical	63,166	53,100	19.2	7.2	moderate
Civil	169,882	156,502	8.5	19.4	none
Electrical	189,943	163,328	16.3	21.6	pressing
Industrial	64,963	57,773	12.3	7.4	moderate
Mechanical	208,857	179,174	16.6	23.8	pressing
Metallurgical	17,577	15,854	10.9	2.0	moderate
Mining	12,701	12,446	2.0	1.4	none
Others	121,545	108,451	12.0	13.9	moderate

Source: *The Supply and Demand of Engineers—1950-1960.*

Does Pentagon Waste Its Scientists' Time?



WITH all the talk of increased missile expenditures, some congressmen are demanding a closer look at how we have been spending the dollars we already have. An important study: The Manpower Utilization Subcommittee headed by Rep. James Davis (D., Ga.) has armed service personnel managers telling how missile scientists and engineers working for Defense Department spend their time.

The most shocking fact disclosed so far: About 30 per cent of the scientists working for the Army report they are not placed in jobs which use up their abilities. The Army admits about 38 per cent of its engineers are at work on jobs demanding high levels of ability, while 30 per cent are working on substandard jobs. The Army and the other services are following industry's lead by using more technicians. Of 20,600 scientists and engineers working for the Army, 11,000 are in missile programs.

A favorable sign: The Army is setting up new pay grades for scientists and engineers which do not include administrative responsibility as a criterion for salary increases. The Army needs about 900 more scientists to work on present programs. Where it, or the other services, would get more for any new missile programs is uncertain. Should industry develop all missiles?

Orval Cook, president, Aircraft Industries Association Inc., believes the use of government arsenals, and private universities, for development work has "serious drawbacks."

He estimates: "There is a time loss of several months to a year" in making the transfer of development knowledge from government work to private industry production. The Air Force agrees with Mr. Cook, while the Army and Navy do much of their own work. Mr. Cook's point of view is also in line with the Hoover Commission's efforts to keep the government out of competition with industry.

"Development and production by industry reduce the time loss" between drawing board and production line. Production problems can be solved while the design is in progress, "eliminating redesign work because some vital component would be too costly to produce," Mr. Cook sums up.

Army Will Fire Its Satellite, Too

The decision to allow the Army to plant its own satellite in an orbit is not good news to some Washington insiders. They regard two satellite projects (the Navy's Vanguard project continues as scheduled) as another example of needless duplication by rival armed services.

If the Army is ready for the job, they say, Vanguard should be dumped, allowing Navy scientists to go on other projects.

If the decision is an example of what is to come from a new defense look, we are making little progress, say critics. In the rush to get bigger objects than the Russians have in the sky, don't be surprised if the Air Force also gets a satellite project. In that event, say proponents of centralized missile and satellite development, we will have an even tougher time keeping ahead of Russian science.

Summing up: Scared by rapid Russian advances, we are in danger of rushing off in all directions at once, as Ike has warned.

Too Many Cooks Can Spoil the Dish

With Congress demanding that something be done quickly, congressmen like Representative Davis are going to have a tough time making their points about manpower utilization, the need for careful spending on new projects, the necessity of eliminating duplication of effort.

The Army's satellite is an indication of the temper of the times.

Ike's appointment of a special presidential assistant for science is O.K. with most top Pentagon observers. His statement that our missile czar, William Holaday, is to be kept informed of all missilework, perhaps be granted responsibility as broad as the Defense secretary's, is not understood.

Ask some generals: Just who is my boss now? Ask some congressmen: Is there anyone really responsible for our new defense look, or is the situation getting more muddled than it was before?

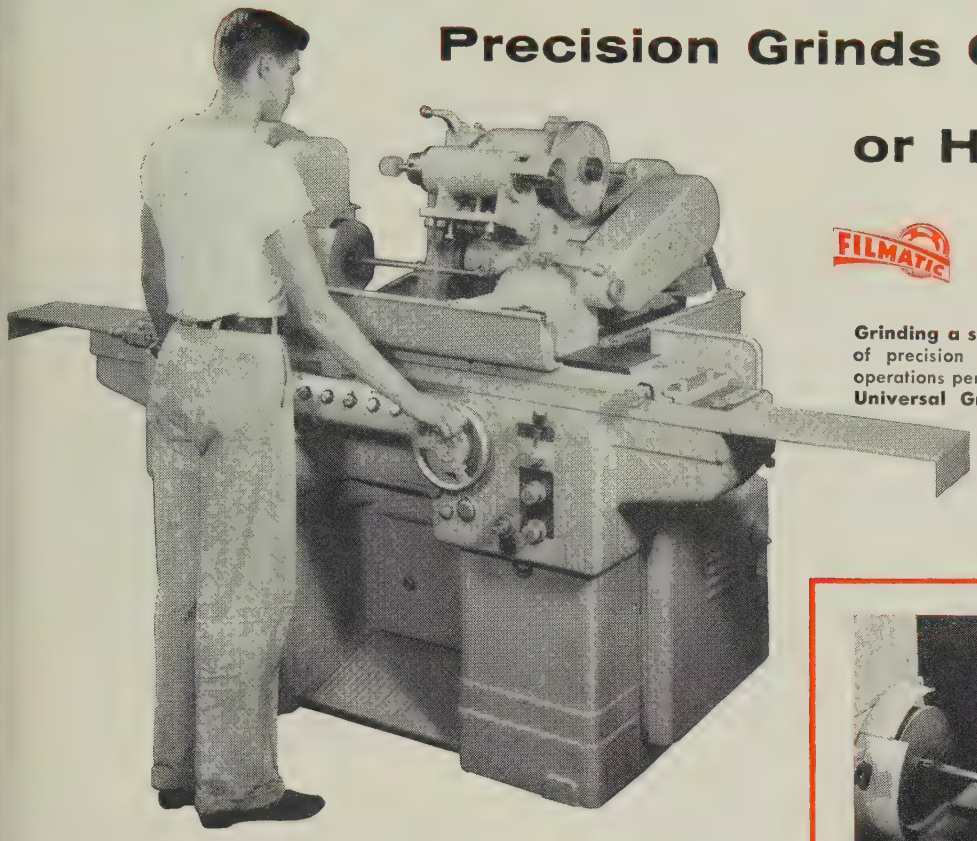
Official Word on Flying Saucers

So STEEL won't be the only publication in the country which hasn't said anything about flying saucers (and to prepare you for the first one you see), here's an abstract of the Air Force's official judgment of the little devils:

1. After ten years "of investigation, analysis, and evaluation of unidentified flying objects, no evidence has been discovered to confirm the existence of so-called flying saucers." 2. The scientists involved in the Air Force's investigation (led by Ohio State University's Dr. J. Allen Hynek) are "completely objective and open minded." 3. Flying saucers are categorized by the AF under six headings: "Balloons, aircraft, astronomical, other, insufficient data, and unknowns." 4. The "other" category includes: "Reflections, searchlights, birds, kites, blimps, clouds, sun dogs, spurious radar indications, hoaxes, fireworks, flares, fireballs, ice crystals, and meteorites. 5. Less than 2 per cent of the sightings are listed as "unknowns."

CINCINNATI 10" UNIVERSAL

Precision Grinds One Part or Hundreds



FILMATIC

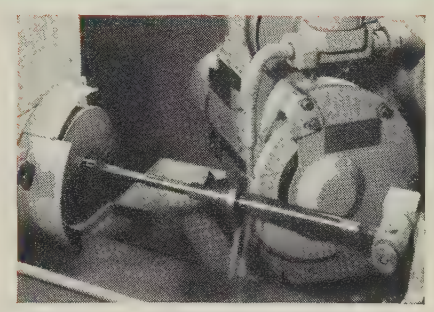
Grinding a slender shaft . . . one of many types of precision toolroom and production grinding operations performed on **CINCINNATI FILMATIC 10" Universal Grinding Machines.**

Look at your universal grinders from this viewpoint: when the need arises, can they handle big quantities at the low cost expected of high production equipment? It's routine work for the CINCINNATI® FILMATIC 10" Universal equipped for automatic infeed grinding. Then you can forget about widely varying lot sizes. ¶ The 10" Universal's extra measure of power is a big factor in both toolroom and production work. Consider these items compared to other machines in its class:

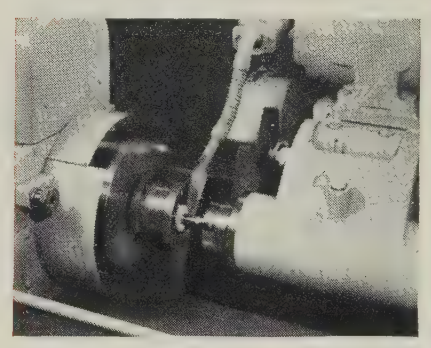
Largest grinding wheel: 12" diam. x 1½" face
Most powerful wheelhead motor: 2 hp
50% larger headstock motor
Exclusive FILMATIC grinding wheel spindle bearings

In addition to all these production advantages, the CINCINNATI FILMATIC is a true universal. Wheelhead swivels 180° and 220°, upper and lower, respectively; headstock swivels 180°; headstock speeds are infinitely variable 60 to 600 rpm. Want more information? Sweet's Machine Tool File contains brief specs. Complete data in catalog No. G-577-6.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

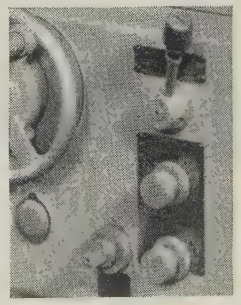


Interchangeable drive and grinding wheel, for grinding the right-hand face of shoulders. An excellent finish is produced with this equipment.



Internal grinding, one of the many operations performed at low, low cost on CINCINNATI FILMATIC 10" Universal Grinding Machines.

CINCINNATI



Automatic infeed elements. This type of equipment is built-in at the factory, does not restrict versatility of the machine in any way.

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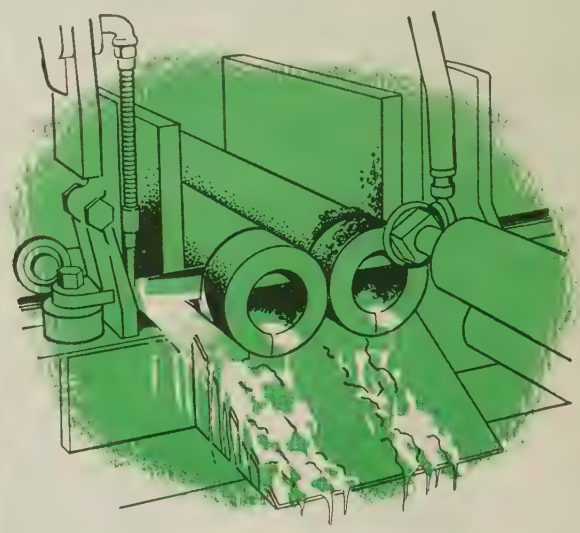
MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Cutting Oil takes the time test

at S. G. Frantz Co., Inc., Trenton, N. J.



S. G. Frantz Company decided to keep a truly open mind.

They'd been using Cities Service Chillo Cutting Oil and other Cities Service products for some time with great satisfaction. Still, there was no harm testing Chillo Cutting Oil against another brand just to make sure they were getting maximum results.

But even the people at S. G. Frantz never expected what followed. Using the competitive oil, and a piece of 4130 aircraft rod, 2⅞" in diameter, they made a single cut at saw speed of 175 feet per minute. Time: 20 minutes.

Next, the same test again — but this time with Cities Service Chillo "A" Cutting Oil. Time: 7 minutes! Nearly three times faster!

Using the same material on another job, the Frantz Company found difficulty making clean threads to aircraft standards on a Number 5 Turret Lathe—that is, until Cities Service Chillo 10Z was tried. Right there the problem ended.

"The problem ended." You'll hear it again and again from those who use Cities Service Cutting Oils and lubricants. And perhaps these oils can end a problem for you, too. Talk with a Cities Service Representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

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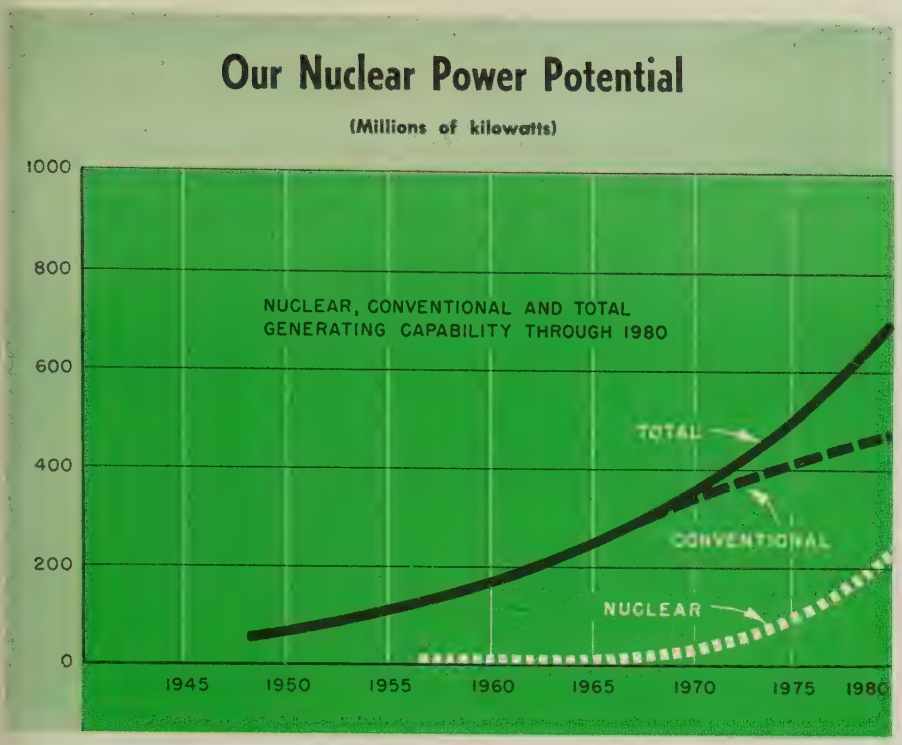


Time for Atomic Decision

Director of AEC's reactor development program says that nuclear power can become economically competitive in ten years if a comprehensive plan is adopted

A DECISION on a nuclear program for the U. S. must be made soon if such power is to become competitive with conventionally generated electricity in the next decade.

The warning was voiced by W. Kenneth Davis, director of reactor development, the Atomic Energy Commission, at the Atomic Industrial Forum in New York.

Eventually—"Nuclear power is bound to become economic someday, even if it costs three times as much as conventional power does today," he said. "This will be when we begin to run out of gas, coal, and oil. We are at least 50 years away from that time, however. What we are discussing here are the problems of reducing the costs of nuclear power to competitive levels in our own time."

While saying that research and experiment must continue, Mr. Davis believes that the water reactor offers more chance of reducing costs and is the best bet for immediate development.

"In all likelihood the largest potential decrease in capital costs will come from demonstrations that water plants can produce two or three times as much power as their original design rating with little modification," he said.

Other Economies—Costs can also be reduced by making large plants, he said. Capital costs for experimental water reactors are not as high as for some other types, according to Mr. Davis.

If a realistic program is adopted, Mr. Davis believes that the construction of large nuclear power stations can begin by 1963 or 1964.

Such a program will require vigorous development work by industry to bring down costs through economic incentives, as distinguished from AEC's cost-plus research, he said.

Management's Part — Utility management must realize that nuclear plants will not be economic at first and must be willing to begin the large scale transition as soon as it becomes evident that such plants have a good chance to be competitive over their full life, he said.

Mr. Davis added that government and public opinion must provide a climate favorable to a nuclear power industry.

City Annexes Missile Site

The City of Newport Beach, Calif., plans to annex the 200-acre site of the proposed Ford Motor Co. missile and weapons research plant.

Aeronautic Systems Inc., a Ford subsidiary, will operate the plant. The first unit, laboratories to test high temperature metals, will be started by April. It will provide employment for about 3000 scientists, engineers, physicists, and technicians.

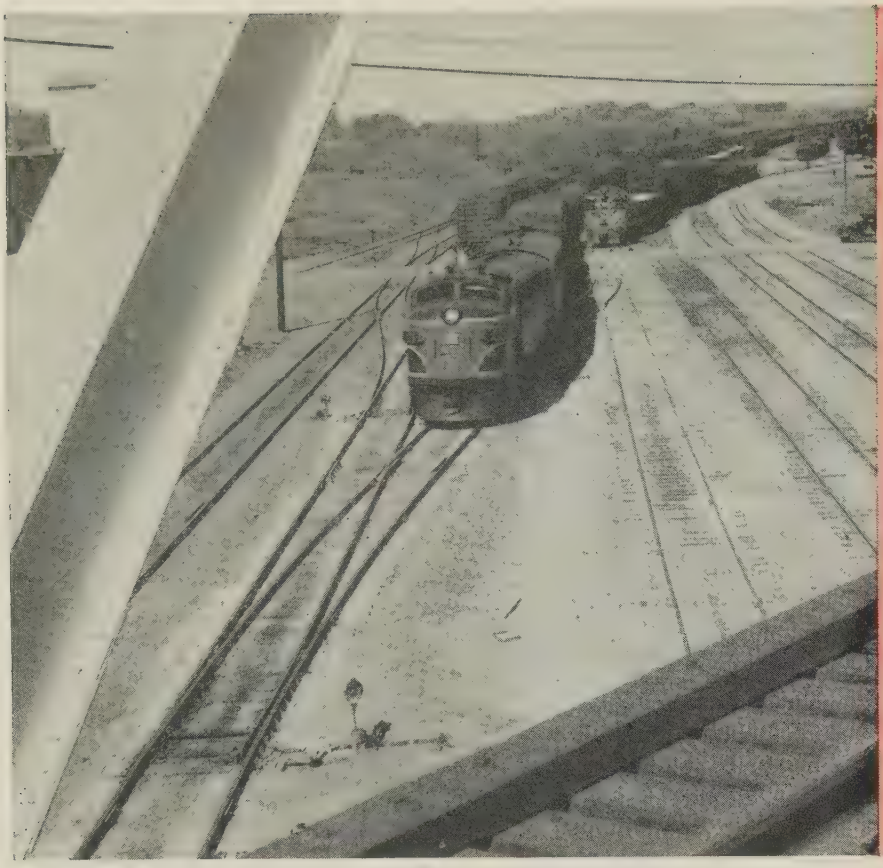
Opens Instrument Plant

Marion Electrical Instrument Co. has moved into a 20,000 sq-ft addition to its 40,000 sq-ft plant at Grenier Field, Manchester, N. H. The area is used for assembly, calibration, and inspection of integrated flight systems, aircraft instruments, and airborne mechanisms.

Westinghouse Adds Plant

Westinghouse Electric Corp. will begin construction of a power circuit breaker plant in Trafford, Pa., early next year. Contracts have been awarded to Kaiser Engineers, a division of Henry J. Kaiser Co., Oakland, Calif. The 241,000 sq-ft plant is scheduled for operation in late 1959.

It will employ about 950, including 800 hourly and 150 salaried personnel. J. W. Stirling, manager of the power circuit breaker department at the firm's East Pittsburgh plant, will head the facility. He said that Westinghouse has more unfilled orders for switchgear equipment than at any time in its history.



The Railroad Situation

Carloadings—Down 4.5%.

New cars delivered in '57—76,873.

New car orders—Down 41%.

Earnings—Down 12%.

Return on net investment—Below 4%.

Employment—Layoffs are widespread.

Rates—Up 107% in 11 years.

Problems—Financing.
Excess terminal time.

Trends—Renting cars.
Piggybacking.
Emphasis on cost control.

Capital Spending—
1958—$1,400 million.*
1957—$1,400 million.*
1956—$1,230 million.

Source: Association of American Railroads.
*Estimated.

Railroads across the country report that . . .

Financing Is Chief Problem

DECLINING INCOME and rising costs are making it difficult for railroads to finance current capital needs.

In the first half of '57, Class I railroads spent $701.8 million for capital goods (up 12.9 per cent from the like '56 period). Spending for roadways was up 2 per cent, for equipment 17 per cent. The Interstate Commerce Commission earlier estimated second half expenditures at $721.7 million and a 1957 total of $1,423.5 million, an increase of 15.6 per cent over the 1956 mark. But railroads now doubt they will reach that level.

They're buying freight cars faster than rails. Road spending in '57 should about equal last year's figure, while equipment purchases should be up about 23 per cent.

Income Drops—The net income of Class I roads in 1957's first nine months was about $538 million, versus $612 million in 1956's like period. In the 12 months ended September, 1957, return on investment averaged only 3.62 per cent, against 3.96 in the previous 12 months. It has not topped 4.5 per cent in the last ten years.

Carloadings this week are about 11 per cent below the 1956 pace. For the first ten months, they're down 4.9 per cent. Most firms expect little change the rest of the year. Possibilities of a slight upturn in 1958 are seen.

Says Ben W. Heineman, chairman of the Chicago & Northwestern: Rails are priced out of the market in certain commodities and are becoming so in others. With the exception of equipment trust certificates, they can't get external financing.

Need To Grow — William T. Faricy, chairman of the Association of American Railroads, contends that carriers must spend at least $1.2 billion a year for expansion to meet increased demands and technological improvements. The problem is where to get the money. Equipment certificates are becoming more difficult and expensive to place. Working capital has diminished rapidly over the last few years.

Rates Are Up—Freight rates were increased in August (see STEEL, Aug. 12, p. 78), but carriers expect to go before the ICC shortly to ask for another hike. They want rates to be measured by commodity classifications. Traditionally, a flat, across-the-board percentage is granted.

Wait and See—Every road has expansion programs on its drawing board, says H. W. von Willer, president of the Erie Railroad, but they must be deferred until management can see its way clear to authorize the expenditures.

Car Orders Lag—In 1957's first nine months, 76,873 new freight cars were delivered, versus 47,459

in 1956's like period. But order backlogs have shrunk to 71,981 (as of Oct. 1), compared with 122,-421 a year ago. Kenneth H. Tuggle, an ICC member, says carriers aren't buying cars fast enough to meet shippers' needs. They have 75,000 fewer cars than they did 15 years ago, and about 40 per cent are over 25 years old. He says 100,000 more cars are needed.

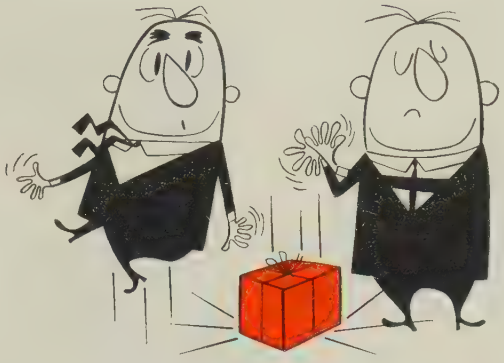
But the depreciation accrual on most cars retired today is only $2500; new cars cost $8500. A bill before Congress would establish a federal agency to help finance freight car purchases, making up to 80 per cent of the cost available. James M. Symes, president of Pennsylvania Railroad, proposed that a federal agency be created to lease cars, but the plan hasn't met much acceptance.

Builder Is Optimistic—Champ Carry, president, Pullman Inc., claims its rail car manufacturing subsidiary, Pullman-Standard Car Mfg. Co., is optimistic about freight car prospects despite the financing difficulties of carriers. But the firm isn't convinced that the future is bright in the passenger car business.

Rentals Pick Up—Some roads find it more economical to rent cars than to own them (earning value is many times the $2.75 per diem charge). There is no incentive for a carrier to provide its fair share of car supply, Mr. Tuggle points out. He emphasizes that railroads need more yard automation, standardized rolling stock, and further development of special purpose cars. Excess terminal time is a pressing problem.

Solutions Offered—Mr. Faricy warns that if replacement programs are to continue one of three things must be done: 1. Railroads must earn more money. 2. Government must reduce its 52 per cent tax. 3. A tax reform must be instituted to allow railroads to accrue replacement costs from depreciation.

Piggybacking Gains—More rails are offering the service; still more plan to do so. Forty roads are carrying trailers on more than 5000 cars a week. That's 25 per cent above the 1956 performance. But there's plenty of room to grow. Annual carloadings exceed 37 million.



When To Drop a Product

The decision is as important and often as tough as giving the green light for a new one. But delay can be expensive. Here are some guideposts

1. Obsolescence . . .

This is the most common reason. Frequently, a company develops a new product to obsolete one of its own. Or a competitor may come up with a product that does the job better, cheaper, or safer.

2. Technological change . . .

Stewart-Warner Corp. produced over 6 million "South Wind" auto heaters before dropping the product in 1950. Carmakers "engineered" S-W out of the market by making heaters standard equipment. To counter, this fall S-W introduced its "Minit Heat," an accessory designed to improve efficiency of auto heaters.

3. Inadequate profit return . . .

Pheoll Mfg. Co. formerly made a line of wood screws. Foreign competition drove prices down, and the firm dropped the line. It's putting more emphasis on special fasteners which have a better return.

4. Distribution problems . . .

Minnesota Mining & Mfg. Co. developed a car and furniture polish it considered superior to any on the market. Sales failed to reach desired levels. Analysis indicated a need to modify distribution methods to compete. Officials decided against the change and dropped the products.

5. Nonallied markets . . .

DoAll Co. developed a bandsaw for butcher shops. For 5 years it was the biggest seller in the trade. But the company decided to drop the line because its basic business was metalworking. To continue in the meat cutting market area would require a completely different sales and service organization.

Have you tried J&L's superior quality

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JALZINC is Jones & Laughlin's new trade name for its *high quality* zinc coated steel sheet and coiled product. JALZINC answers your toughest forming, rolling and drawing problems.

Produced by the proven Sendzimir process, JALZINC has a tight, uniform coating that resists cracking and flaking. The high lustre finish greatly improves the appearance of your end product. JALZINC is available in a wide range of gages and widths in both cut lengths and coils.

Users are enthusiastic about JALZINC'S uniform ductility, flatness and surface finish. Write today for complete details.

J&L inspector examines a roll of 18 gage JALZINC as it is coiled on a reel of the new Sendzimir continuous line.

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'58 Models—What You Get for Your Money

(Based on four-door hardtop sedans with V-8 engines)

MAKE	SPECIFICATIONS								ACCESSORY PRICES				
	Price	Wheelbase	Length	Height	Shipping Weight (lb)	Bhp @ rpm	Axle Ratio	Comp Ratio	Auto Trans.	Power Steering	Power Brakes	Radio	Heater & Defroster
PLYMOUTH													
Plaza*	$2,276	118	204.6	56.6	3,280	132/3,600	3.73:1	8:1	$179.55	$76.50	$37.70	$73.00	$69.40
Savoy	2,506	118	204.6	54.6	3,450	225/4,400	3.31:1	9:1	179.55	76.50	37.70	73.00	69.40
Belvedere	2,634	118	204.6	54.6	3,475	225/4,400	3.31:1	9:1	179.55	76.50	37.70	73.00	69.40
DODGE													
Coronet V-8	2,764	122	213.8	54.6	3,550	252/4,400	3.31:1	9:1	179.55	92.25	38.35	86.50	83.65
Royal V-8	2,915	122	213.8	54.8	3,565	265/4,400	3.15:1	10:1	179.55	92.25	38.35	86.50	83.65
Custom Royal	3,142	122	213.8	54.8	3,635	295/4,600	3.15:1	10:1	179.55	92.25	38.35	86.50	83.65
DE SOTO													
Firesweep	2,953	122	216.5	55.1	3,660	280/4,600	3.31:1	10:1	179.55	106.30	39.35	94.20	89.30
Firedome	3,234	126	218.6	55.5	4,015	295/4,600	3.15:1	10:1	179.55	106.30	39.35	94.20	89.30
Fireflite	3,731	126	218.6	55.5	3,930	305/4,600	3.15:1	10:1	179.55	106.30	39.35	94.20	89.30
CHRYSLER													
Windsor	3,279	122	218.1	54.8	3,915	290/4,600	2.93:1	10:1	179.55	106.30	39.80	124.10	93.30
Saratoga	3,955	122	220.2	55.1	4,145	310/4,600	2.93:1	10:1	Std	Std	39.80	124.10	93.30
New Yorker	4,403	122	220.2	55.2	4,240	345/4,600	3.31:1	10:1	Std	Std	39.80	124.10	93.30
Crown Imperial	5,632	129	225.8	56.6	4,915	345/4,600	2.93:1	10:1	Std	Std	Std	176.00	140.60
FORD													
Custom 300	2,256	116	202	57.1	3,361	240/4,600	3.10:1	9.5:1	179.80	68.70	37.10	77.10	70.80
Fairlane	2,552	118	207	56.2	3,545	265/4,600	2.91:1	9.5:1	179.80	68.70	37.10	77.10	70.80
Fairlane 500	2,632	118	207	56.2	3,553	300/4,600	2.91:1	10.2:1	179.80	68.70	37.10	77.10	70.80
EDSEL													
Ranger	2,678	118	213	56.4	3,796	303/4,600	2.91:1	10.5:1	217.70	84.95	38.25	95.25	93.45
Pacer	2,863	118	213	56.4	3,857	303/4,600	2.91:1	10.5:1	217.70	84.95	38.25	95.25	93.45
Corsair	3,425	124	218.8	56.8	4,235	345/4,600	2.91:1	10.5:1	Std	84.95	38.25	95.25	93.45
Citation	3,615	124	218.8	56.8	4,230	345/4,600	2.91:1	10.5:1	Std	84.95	38.25	95.25	93.45
MERCURY													
Monterey	2,840	122	211.1	56.5	4,150	312/4,600	2.69:1	10.5:1	225.80	107.50	37.70	100.00	91.40
Montclair	3,365	122	211.1	56.5	4,165	330/4,800	2.69:1	10.5:1	Std	107.50	37.70	100.00	91.40
Park Lane	3,944	125	220.2	56.5	4,390	360/4,600	2.91:1	10.5:1	Std	Std	Std	100.00	91.40
LINCOLN													
Capri	4,951	131	229	56.5	4,810	375/4,800	2.87:1	10.5:1	Std	Std	Std	175.30	135.50
Premiere	5,565	131	229	56.5	4,880	375/4,800	2.87:1	10.5:1	Std	Std	Std	175.30	135.50
Continental Mark III	6,072	131	229	56.5	4,965	375/4,800	2.87:1	10.5:1	Std	Std	Std	175.30	135.50
CHEVROLET													
Delray*	2,155	117.5	209	57.1	3,442	185/4,600	3.36:1	8.5:1	188.30	69.95	37.70	84.00	49.25
Biscayne*	2,290	117.5	209	57.1	3,450	250/4,400	3.36:1	9.5:1	188.30	69.95	37.70	84.00	49.25
BelAir	2,511	117.5	209	57.1	3,514	250/4,400	3.36:1	9.5:1	188.30	69.95	37.70	84.00	49.25
PONTIAC													
Chieftain	2,792	122	210.5	57.0	3,785	270/4,600	3.23:1	10:1	231.34	107.50	39.77	101.65	96.30
Super Chief	2,961	124	215.5	57.0	3,810	270/4,600	3.08:1	10:1	231.34	107.50	39.77	101.65	96.30
Star Chief	3,210	124	215.5	57.0	3,850	285/4,600	3.08:1	10:1	231.34	107.50	39.77	101.65	96.30
OLDSMOBILE													
88 Series	2,971	122.5	208.2	56.9	4,035	265/4,400	3.08:1	10:1	231.34	107.50	39.77	101.65	96.52
Super 88	3,339	122.5	208.2	56.9	4,073	305/4,600	3.23:1	10:1	231.34	107.50	39.77	101.65	96.52
Series 98	4,096	126.5	216.7	56.7	4,391	305/4,600	3.42:1	10:1	Std	Std	Std	134.82	96.52
BUICK													
Special	2,820	122	211.8	57.6	4,180	250/4,400	3.23:1	9.5:1	220.38	107.50	39.78	102.13	102.13
Century	3,436	122	211.8	56.9	4,267	300/4,600	3.23:1	10:1	Std	107.50	39.78	102.13	102.13
Super	3,789	127.5	219.1	59.4	4,500	300/4,600	3.23:1	10:1	Std	Std	39.78	102.13	102.13
Roadmaster	4,667	127.5	219.1	59.6	4,668	300/4,600	3.23:1	10:1	Std	Std	Std	102.13	102.13
Limited	5,112	127.5	227.1	59.6	4,710	300/4,600	3.23:1	10:1	Std	Std	Std	102.13	102.13
CADILLAC													
Series 62	5,497	129.5	225.3	59.1	4,855	310/4,800	3.07:1	10.25:1	Std	Std	Std	164.25	128.85
Fleetwood 60	6,232	133	225.3	59.1	4,930	310/4,800	3.07:1	10.25:1	Std	Std	Std	164.25	128.85
Fleetwood 75	8,460	149.75	237.1	61.6	5,360	310/4,800	3.36:1	10.25:1	Std	Std	Std	164.25	128.85
RAMBLER													
Ambassador	2,822	117	200	57.6	3,475	270/4,700	3.15:1	9.7:1	229.50	89.50	39.95	98.50	82.50
Rebel V-8	2,342	108	191	58	3,328	215/4,900	3.55:1	8.7:1	219.50	84.50	37.95	82.50	76.00
Super 6†	2,287	108	191	58	2,983	127/4,200	3.31:1	8.7:1	199.50	79.50	37.95	82.50	76.00
STUDEBAKER													
Scotsman†	1,874	116.5	202⅜	58	2,735	101/4,000	3.54:1‡	7.8:1	N.A.	N.A.	N.A.	N.L.	Std
Champion†	2,253	116.5	202⅜	58	2,830	101/4,000	3.54:1	7.8:1	189.00	68.86	37.66	79.90	71.00
Commander	2,378	116.5	202⅜	57.75	3,155	180/4,500	3.31:1	8.3:1	189.00	68.86	37.66	79.90	71.00
President	2,639	120.5	206½	57.5	3,325	225/4,500	3.54:1	7.8:1	189.00	68.86	37.66	79.90	71.00

Prices include federal excise tax, plus suggested handling and distribution charges. State and local taxes, transportation charges, and accessories are not included. †Six-cylinder engine standard. ‡Standard transmission only. *Indicates four-door sedan. Shipping weights are approximate.

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Aluminum Use Rises

USE OF ALUMINUM on 1958 cars has been stepped up by 13 per cent, according to a survey by Kaiser Aluminum & Chemical Sales Inc., Chicago.

The average amount in new models is 44.9 lb, compared with 39.6 lb in '57s. In 1956, the average auto used 35.2 lb, says Aluminum Co. of America, Pittsburgh.

General Motors shows the biggest boost in consumption. Its average car now uses 41.6 lb, against 32 lb in 1957 models. Ford is up from 35.7 lb to 39.6 lb, while Chrysler has dropped to 63.3 lb from 65.2 lb. Studebaker-Packard and American Motors Corp. remain unchanged at 22.6 and 48.8 lb.

Six Switch Grilles—Trim applications have received most attention so far. Among those switching to aluminum grilles are Ford, Lincoln, Thunderbird, Rambler, Pontiac, and Oldsmobile.

But producers believe the biggest gains will come in functional parts. Battery cables stamped from aluminum strip are being considered for one 1960 luxury car.

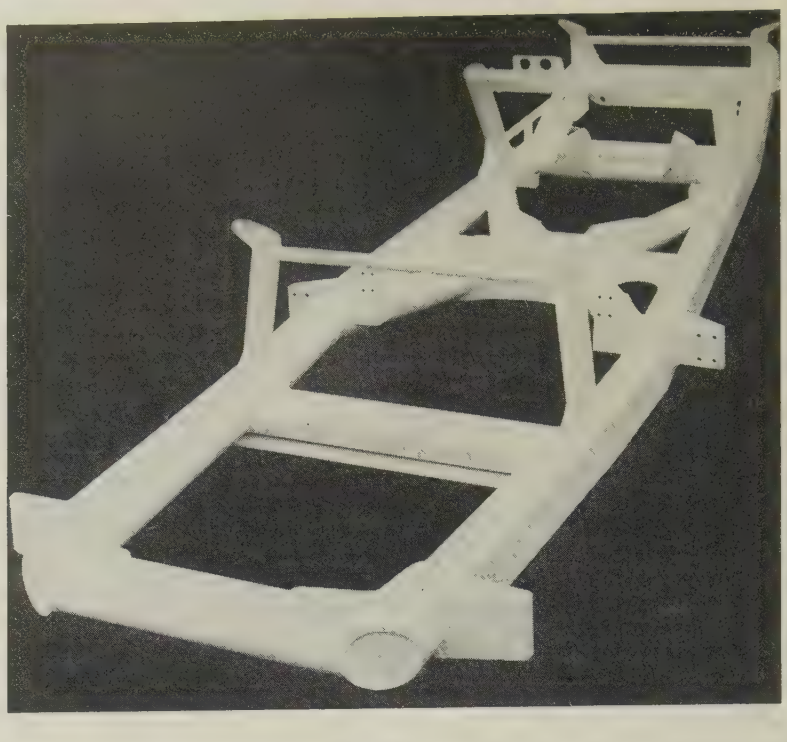
Ford supposedly is investigating diecast aluminum rocker arms. Recent developments in glass-lined steels may be an answer to some of the problems of lining cylinder walls of aluminum engine blocks.

U. S. Auto Output

	Passenger Only 1957	1956
January	642,089	612,078
February	571,098	555,596
March	578,826	575,260
April	549,239	547,619
May	531,365	471,675
June	500,271	430,373
July	495,629	448,876
August	524,354	402,575
September	274,265	190,716
October	327,362	389,061
10 Mo. Total	4,994,498	4,623,829
November		581,803
December		597,226
Total		5,802,808

Week Ended	1957	1956
Oct. 12	38,626	70,175
Oct. 19	72,180	88,557
Oct. 26	104,987	104,269
Nov. 2	126,139	117,583
Nov. 9	138,668†	132,087
Nov. 16	145,000*	135,641

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.



Argonaut Has Massive Frame

• Soon to make its debut, the Cleveland-built roadster has a 1060-lb frame made of 5 in., cold drawn steel tubing, with 3/16-in. walls and ¼-in. attachments. It's coated with white vinyl paint (see STEEL, Aug. 26, p. 49).

If the frame appears to be overdesigned, there's a reason: It's expected to provide most of the car's structural rigidity. (In other autos, the body supplies 70 per cent of structural strength, the frame 30 per cent.) By putting an aluminum body on a heavy frame, company officials hope to give Argonaut the lowest center of gravity in the industry and exceptional cornering ability.

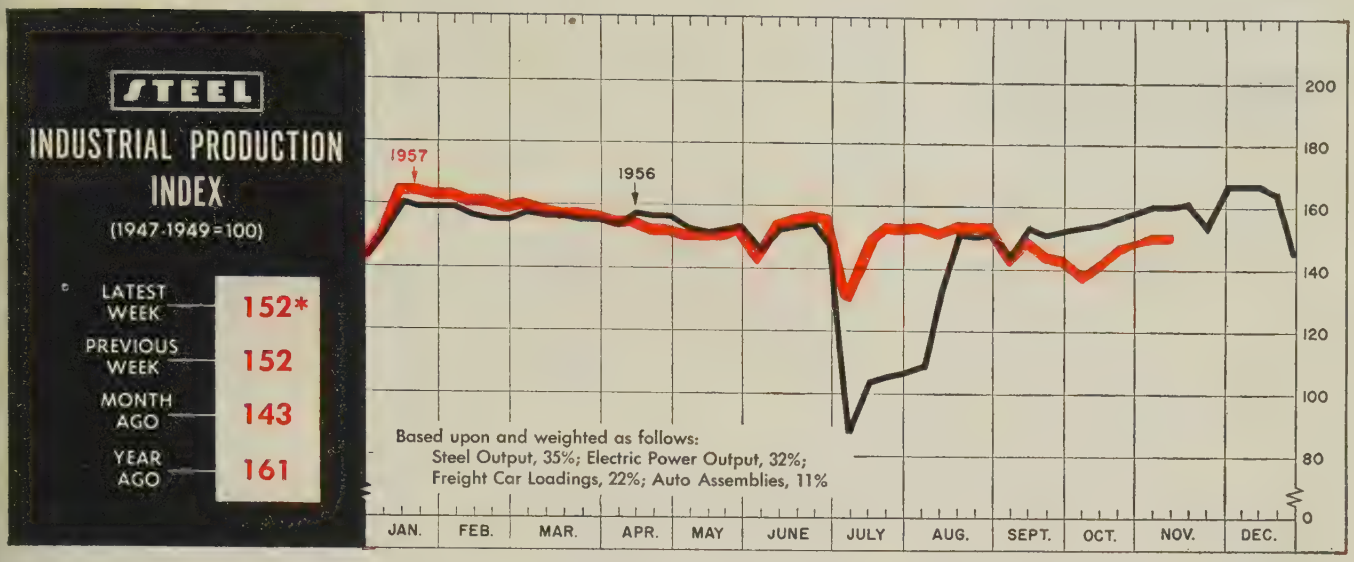
Specifications—Wheel base, 127 in.; length, 215 in.; tread, 66 in. (8.20 x 15 racing tires are used); height to cowl, 37 in.; curb weight, 4000 lb.

The V-8 engine has a displacement of 392 cu in. and is said to be one of the most powerful ever installed in a production automobile. Its driveshaft is stressed for 9000 rpm. Transmission options are manual with floor shift, or three-speed automatic. The engine oil is cooled by an oil radiator. Fuel tank capacity is 32 gallons; fuel consumption is estimated at 15 mpg.

Engineering — Boasting 50-50 weight distribution, the Argonaut doesn't have power steering. It has power brakes, but the power isn't achieved through vacuum assists. The suspension system consists of torsion bars in front and semielliptic springs at the rear. Front and rear shock absorbers are individually adjustable from the cockpit.

The Argonaut is being hand assembled in a leased Cleveland plant. First year production is expected to run "between 600 and 1000." Backed by businessmen and industrialists of Cleveland, Detroit, Pittsburgh, and Canton, Ohio, it will be distributed by American agencies for foreign cars.

The price: More than $10,000.



*Week ended Nov. 9.

Indicators Show More Adjustment on Way

STEEL's economic indicators, several of which are shown on the next two pages, point to a continuation of the rolling adjustment which has characterized our economy most of this year. It means: Pressure for short term expansion will probably ease up still more, but over-all production will hold at a level only slightly below the pace of the last two years.

STEEL keeps a monthly record on 45 statistical series. They cover orders and sales (11), shipments or production (21), backlogs (6), prices and wages (5), and employment (2). With few exceptions, the latest information covers September.

Scoreboard—At presstime, 19 of the 45 were above the level of the previous month, while 26 were below. Significantly, most of the gains (13) were in production, while only three of the orders and sales series were ahead. Backlog gained in only one industry—malleable foundries. Both wages and prices showed a mixed pattern.

Compared with year-ago figures, the score shows clearly that industry is following pretty much of a seasonal pattern but at a lower level. Only ten indicators were above the year-ago levels compared with 32 below. Of the ten, wages and prices accounted for four; orders and sales showed two plusses; shipments, four. Both backlogs and employment (steel and metalworking) failed to show any year-to-year gains.

Interpretation — Those raw scores can be somewhat misleading, especially on a month-to-month basis. Several of the downtrends—such as those in construction, fabricated structural steel, and refrigerators—are normal in the fall.

Most of the uptrends are also normal, such as the marked increase in the radio-TV industry (see chart, Page 128). Some of the uptrends—specifically in prices—are undesirable, especially when

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,984[1]	1,996	2,466
Electric Power Distributed (million kw-hr)	11,850[1]	11,860	11,522
Bituminous Coal Output (1000 tons)	9,775[1]	9,880	10,525
Petroleum Production (daily avg—1000 bbl)	6,700[1]	6,712	7,050
Construction Volume (*ENR*—millions)	$147.9	$370.7	$281.0
Auto, Truck Output, U. S., Canada (*Ward's*)	169,879[1]	154,894	162,131
TRADE			
Freight Car Loadings (1000 cars)	700[1]	714	772
Business Failures (Dun & Bradstreet)	250	281	271
Currency in Circulation (millions)[3]	$31,114	$31,008	$30,964
Dept. Store Sales (changes from year ago)[3]	−2%	−1%	−3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,617	$21,630	$19,862
Federal Gross Debt (billions)	$273.7	$274.4	$275.0
Bond Volume, NYSE (millions)	$21.6	$22.9	$15.8
Stocks Sales, NYSE (thousands of shares)	9,666	9,958	9,147
Loans and Investments (billions)[4]	$86.7	$86.5	$85.7
U. S. Govt. Obligations Held (billions)[4]	$25.2	$25.3	$26.0
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	239.15	225.92
STEEL's Nonferrous Metal Price Index[6]	206.3	206.9	255.7
All Commodities[7]	117.5	117.5	115.4
Commodities Other Than Farm & Foods[7]	125.6	125.6	123.6

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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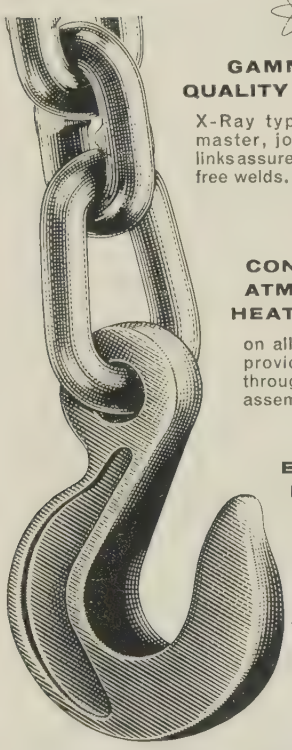

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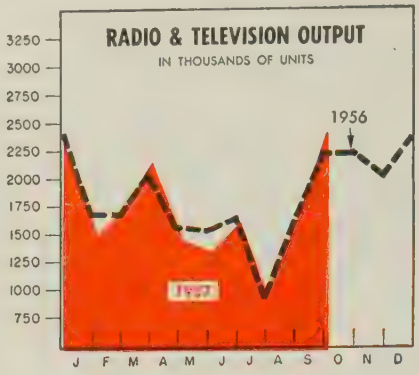
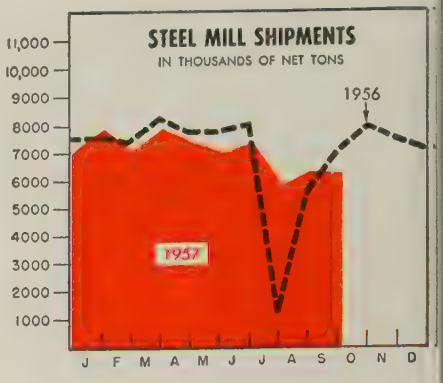
THE BUSINESS TREND





	Radio		Television	
	1957	1956	1957	1956
Jan.	1,086	1,079	450	588
Feb.	1,265	1,094	465	576
Mar.	1,609	1,360	560	680
Apr.	1,116	993	361	550
May	1,024	1,060	342	468
June	1,088	1,073	544	553
July	613	567	360	337
Aug.	966	991	674	613
Sept.	1,611	1,319	833	894
Oct.	....	1,349	...	821
Nov.	....	1,382	...	680
Dec.	....	1,715	...	627
Totals	....	13,982	...	7,387

Electronic Industries Association.
Charts copyright, 1957, STEEL.

	Net Tons		
	1957	1956	1955
Jan.	7,809,451	7,587,870	6,009,958
Feb.	7,066,732	7,463,393	6,119,900
Mar.	7,821,616	8,255,824	7,268,795
Apr.	7,349,752	7,783,873	7,279,321
May	6,972,091	7,764,776	7,540,889
June	7,284,616	8,077,805	7,770,213
July	5,877,133	1,288,988	6,250,597
Aug.	6,229,853	5,539,915	7,053,615
Sept.	6,171,674	7,058,028	7,378,247
Oct.	.....	7,930,957	7,216,821
Nov.	.....	7,431,136	7,247,994
Dec.	.....	7,064,093	7,580,943

American Iron & Steel Institute.

they are accompanied by decreasing employment and wages.

In one typical week, in which six series were updated, the direction of two trendlines remained unchanged, while the other four were reversed. Yet the score did not change, a situation typical of our rolling adjustment. While some of the declines are fairly steep (see steel mill shipments and durable goods charts above), they are counterbalanced by strong activities in such industries as construction (see chart above) and auto output. There is every indication that the rolling adjustment will be with us for some time to come.

Employment Falls Short

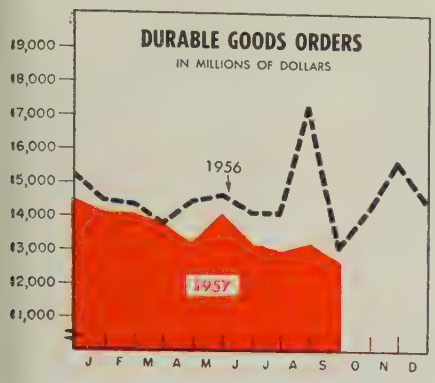
Employment is a good example of crosscurrents at work. The departments of Labor and Commerce report that total employment in October rose by only 300,000 over the September figure to 66 million. This was far less than the seasonal rise of the last few years. On the plus side were agriculture—rebounding from a poor September—and trade and educational services. Offsetting these to a large degree was a further reduction in manufacturing payrolls. Unemployment remained at 2.5 million.

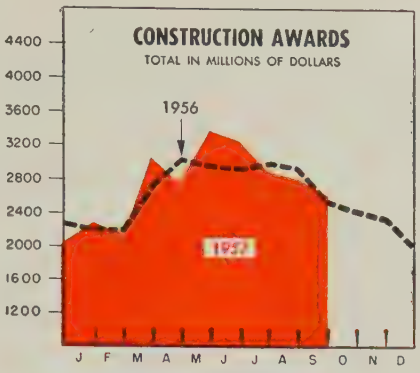
The reduction in manufacturing employment seems destined to continue for some time. The latest report of the Chamber of Commerce of Cleveland (a bellwether area in metalworking) shows that the downward drift has been going on since July. For about 2.5 years, employment of the 100 or so reporting manufacturing companies has held around 109,000. In the last four months, the figure has slipped from 109,700 to 103,800.

J. W. Vanden Bosch, the chamber's labor specialist, says that there is little chance of the slump bottoming out in November. Only eight respondents expect to increase employment; nine expect to lay off; and 60 expect to hold steady. At this time of year, he states, makers of auto parts usually provide the push that keeps general employment up. This year, even though the auto industry is fairly strong, it is not strong enough to outweigh cutbacks elsewhere.

Index Holds Steady

Plusses and minuses canceled each other out and left STEEL's industrial production index reading





	New Orders* 1957	New Orders* 1956	Sales* 1957	Sales* 1956
Jan.	14,176	14,449	14,941	13,832
Feb.	14,102	14,374	14,808	13,824
Mar.	13,853	13,771	14,198	13,252
Apr.	13,234	14,468	14,254	13,723
May	14,115	14,654	14,296	13,570
June	13,249	14,093	14,207	13,587
July	13,005	14,087	14,573	13,021
Aug.	13,200†	17,342	14,300†	13,723
Sept.	12,700†	13,042	14,100†	13,449
Oct.	.....	14,312	.....	14,393
Nov.	.....	15,776	.....	14,249
Dec.	.....	14,543	.....	14,526

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.

	Total 1957	Total 1956	Building 1957	Building 1956
Jan.	2,299.6	2,221.1	1,730.7	1,596.5
Feb.	2,161.0	2,229.5	1,695.5	1,694.9
Mar.	3,078.0	2,769.5	2,199.7	2,250.3
Apr.	2,776.4	3,045.5	2,069.7	2,392.3
May	3,399.5	2,980.2	2,416.8	2,317.3
June	3,243.5	2,947.5	2,341.5	2,226.5
July	2,900.7	3,013.0	2,247.6	2,217.5
Aug.	2,818.0	2,953.3	2,291.8	2,157.7
Sept.	2,624.9	2,575.1	2,092.2	1,977.6
Oct.	.....	2,443.0	.....	1,914.6
Nov.	.....	2,377.3	.....	1,869.3
Dec.	.....	2,057.2	.....	1,455.6
Totals	.....	31,612.2	.....	24,070.0

F. W. Dodge Corp.

at a preliminary 152 (1947-49=100) for the week ended Nov. 9. As in recent weeks, the strength was in electric power output and auto production. But the year-long weakness in freight carloadings (especially the miscellaneous category, which includes most of metalworking) and the contra-seasonal downtrend in steel output have kept the index from reaching its pre-Labor Day levels.

The pattern of electric power production is as mixed as the pattern for metalworking. The Central Industrial Division, which traditionally shows the largest year-to-year gains, is running below the national average of about 3 per cent. The front-runners have been the less industrial New England, West Central, and Southeast Divisions.

Building Troubles Ahead?

The construction industry generally had a good October, but the first week of November showed cause for worry.

The departments of Labor and Commerce reported that work put in place in October set a high for the month ($4.5 billion). On the basis of the first ten months, it now looks like 1957 will be a $47 billion construction year, compared with $46 billion last year.

It was a pretty good month for awards, too, topping September by 9 per cent. Most categories showed gains, says *Engineering News-Record*. The total was 28 per cent below the October, 1956, figure. Performance in the first ten months is 16 per cent behind that of the corresponding period last year. Awards during the week ended Nov. 7 (shortened by Election Day) dropped to $147.9 million, the lowest weekly figure since the second week in December, 1953.

Trends Fore and Aft

• Tappan Stove Co. expects sales of its ranges to reach an all-time high in 1957. September was the best month in the company's history.

• Gwilym A. Price, president of Westinghouse Electric Corp., says that 1958 looks better than 1957 from a profit standpoint. He says: "Next year and succeeding years will reach a plateau of earnings substantially higher than any Westinghouse has had in the post-war era."

Cold Heading Cuts Costs

Fasteners and Small Parts Show Big Savings

One of the most important cost cutting developments in recent years is the increasing use of cold headed fasteners and small parts throughout industry. Parts produced by this process show marked savings when compared to the same production on screw machines. The most obvious advantage is in the economical wire stock used in cold heading. The more expensive bar stock used in the screw machine method results in considerable waste, whereas the waste is almost negligible in cold heading.

Another important consideration is the greater strength structure of parts made by the cold heading method. The blow of the heading tool causes the grain structure of the metal to flow in lines of greater strength whereas the strong outer surface of the screw machine product has been reduced to scrap.

The possibilities of cold heading are almost unlimited when used in conjunction with secondary operations. The tremendous savings in operation and material costs make it a must consideration when designing small parts either as fasteners or as integral units for manufactured parts. It has been a long time policy of John Hassall, Inc. to support their cold heading equipment with the latest methods of secondary manufacture. Machines for roll threading, slotting, drilling, tapping and many other operations are available for your profit.

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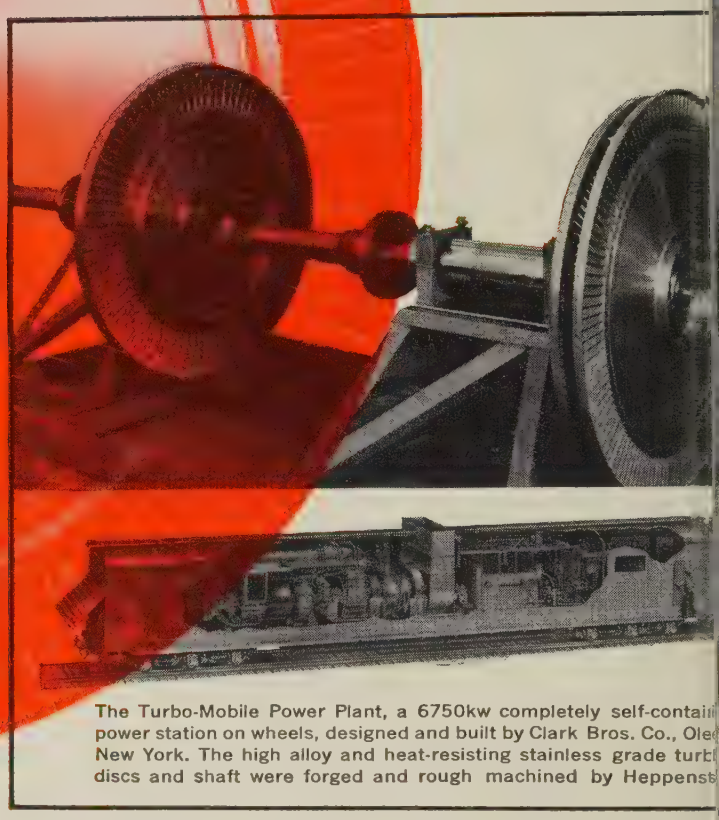

The Turbo-Mobile Power Plant, a 6750kw completely self-contain power station on wheels, designed and built by Clark Bros. Co., Ole New York. The high alloy and heat-resisting stainless grade turb discs and shaft were forged and rough machined by Heppenst

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EDWARD W. MOFFITT
Heppenstall plant mgr.

United Engineering & Foundry Co., Pittsburgh, appointed **R. Wesley Fish** to sales and service engineer in the roll division. He was sales and service engineer in the machinery division.

V. L. Bradford, executive vice president, **Milford Rivet & Machine Co.**, Milford, Conn., was elected president to succeed **F. H. Merwin,** now chairman.

George J. Parker was made general manager of **Norden - Ketay Corp.'s** Florida gear division in Miami, Fla. He was vice president of Daystrom Inc. **Jay R. Gill,** who was acting as general manager, Florida division, continues as sales manager for the division.

Raymond J. Zale was appointed general sales manager, **Vulcan Crucible Steel Div.**, Aliquippa, Pa., H. K. Porter Company Inc. He was previously with Firth-Sterling Inc., and Lindberg Steel Treating Co.

Raytheon Mfg. Co.'s missile systems division, Waltham, Mass., appointed **T. C. Wisenbaker** assistant division manager. He was manager of Raytheon's Bristol, Tenn., plant and is replaced by **H. T. Ashworth.**

William B. Hammond was made sales manager, **American Metal Hose Div.**, American Brass Co., Waterbury, Conn., subsidiary of Anaconda Co.

James J. H. Hill was made manager of stainless steel sales, **Hill-Chase & Co. Inc.**, Philadelphia.

John Lawrence was elected vice president, **Dresser Industries Inc.**, Dallas. He resigned as president of Joy Mfg. Co.

Leonard M. Clark and **George F. Hagger** were appointed vice president and vice president-engineering, respectively, at **Snap-Tite Inc.**, Union City, Pa. Mr. Clark was sales manager. Mr. Hagger was director of engineering.

J. Burton Henry was made sales manager, new products division, **International Resistance Co.**, Philadelphia. He continues as administrator for all IRC sales.

James M. Carman was made staff assistant to the director of steel sales for **A. M. Byers Co.**, Pittsburgh. He was a member of the manufacturing analysis department at General Tire & Rubber Co.

Dr. J. F. Downie Smith was elected a vice president of **Carrier Corp.**, Syracuse, N. Y., in charge of its central research and development division. **Walter A. Grant,** vice president, was made co-ordinator for all development engineering activities.

Floyd R. Anderson, chief metallurgist of the Denver division of **Gardner-Denver Co.**, was named assistant manager of the division. He is succeeded by **Richard F. Schaffer,** former assistant metallurgist.

W. H. Oswald was elected vice president, **Alvey Conveyor Mfg. Co.**, St. Louis.

Edward W. Moffitt was appointed general manager of the Bridgeport, Conn., plant of **Heppenstall Co.** He was manager of sales production and metallurgy.

C. E. Johnson was made an assistant general manager at **Bethlehem Steel Co.'s** Sparrows Point, Md., plant. He is succeeded as superintendent of the rod and wire division there by **W. R. Mackay,** former assistant superintendent, who is replaced by **R. A. McCarthy.**

Olaf O. Roberts Jr. was promoted to assistant general sales manager, **Granco Steel Products Co.**, St. Louis. He continues responsibility for sales and promotion of Granco's galvanized roof products.

James G. Moore Jr. was made acting factory manager of the Utica, N. Y., division of **Bendix Aviation Corp.**

Trent Tube Co., subsidiary of Crucible Steel Co. of America, appointed **Charles A. Kuhnmuench** sales manager for the Chicago-Indianapolis-St. Louis district, with headquarters in Chicago; and **William H. Collins** sales manager for the Pittsburgh - Cleveland - Cincinnati district, with headquarters in Pittsburgh.

John E. Decker was made chief metallurgist of **Green River Steel Corp.**, Owensboro, Ky., subsidiary of Jessop Steel Co.

Earl H. Anderson was appointed assistant to the works manager at **Edward Valves Inc.**, East Chicago,

EDMUND M. VELTEN
Beryllium tech. dir.

DOUGLAS C. ALBRIGHT
American Welding div. mgr.

CHARLES M. SCHENCK
joins L. R. Kerns Co.

Ind., subsidiary of Rockwell Mfg. Co.

Edmund M. Velten was appointed technical director, **Beryllium Corp.**, Reading, Pa. For the last six years, he directed programs concerned with metallic beryllium for the Atomic Energy Commission.

Douglas C. Albright was named manager of manufacturing for the building products division of **American Welding & Mfg. Co.**, Warren, Ohio. He was assistant to the vice president-manufacturing at Crane Co.

Burton S. Payne Jr. was named to head the metallurgical research and development group in the research division of **Pfaudler Co.**, Rochester, N. Y. He succeeds **Richard E. Avery**, now assigned quality control work on the staff of the works manager.

Robert A. Jewett was made product sales manager for chemicals, phosphors, and semiconductors for the chemical and metallurgical division, **Sylvania Electric Products Inc.**, Towanda, Pa.

Don A. Jackson was promoted to factory manager, **Wallace Barnes Co. Ltd.**, Hamilton, Ont., Canadian subsidiary of Associated Spring Corp. He succeeds **Douglas Park**, now purchasing agent of Associated Spring's B-G-R Div. in Plymouth, Mich.

Erwin G. Schoeffel was named assistant operations manager at Massena, N. Y., for **Aluminum Co. of America. Ernest T. Wagner** was named smelting works manager to succeed Mr. Schoeffel.

Charles M. Schenck joined **L. R. Kerns Co.**, Chicago, as manager of technical sales-rolling oils. He was formerly connected with U. S. Steel Corp. in the cold reduction department, Fairless Works.

Robert J. Hume was made manager of dome sales for **Kaiser Aluminum & Chemical Sales Inc.**, Chicago.

J. Parker Bowden was made superintendent of manufacturing at the Philadelphia plant of **George D. Ellis & Sons Inc.** He was superintendent of the munitions division of Kennedy Van Saun Engineering & Mfg. Co.

Carl Linde was promoted to assistant sales manager, machine tool hydraulics and related structures, **John S. Barnes Corp.**, Rockford, Ill. He continues as chief service engineer.

Irwin Schlosser, vice president, **Central Foundry Co.**, Newark, N. J., assumes added duties as assistant to the president. **John J. Flynn**, general sales manager of the soil pipe division, was named vice president-sales.

Christian J. Goodman Jr. was made product sales manager in **General Electric Co.'s** semiconductor products department, Syracuse, N. Y. He is replaced as district sales manager for New Jersey and eastern Pennsylvania by **Arling Woolaver.**

Andrew G. Scott was made Detroit district sales manager for **Pittsburgh Steel Co.**, succeeding **R. F. Derr**, resigned.

James A. Lyon succeeds **Thomas L. Travers**, retired, as assistant to the manager of the Elmira, N. Y., plant of **American Bridge Co.**

C. W. Parker Jr. was made Philadelphia district manager, **Allis-Chalmers Industries Group**, Allis-Chalmers Mfg. Co. He succeeds **A. D. Brown**, who transfers to the regional office staff. **J. M. Mathews** was named successor to Mr. Parker as manager of the Richmond, Va., district.

Dow Chemical Co. appointed **J. R. Stein** general manager of its Louisiana division facilities, now under construction.

Howard C. Rutledge was named sales manager, railway equipment division, **Nordberg Mfg. Co.**, Milwaukee.

Joseph V. Stephen was made manager of the expanded **General Steel Products Div.**, Seneca Steel Service Inc., Buffalo.

Firth Sterling Inc., Pittsburgh, promoted **Kenneth E. McKown** to assistant manager, steel sales division.

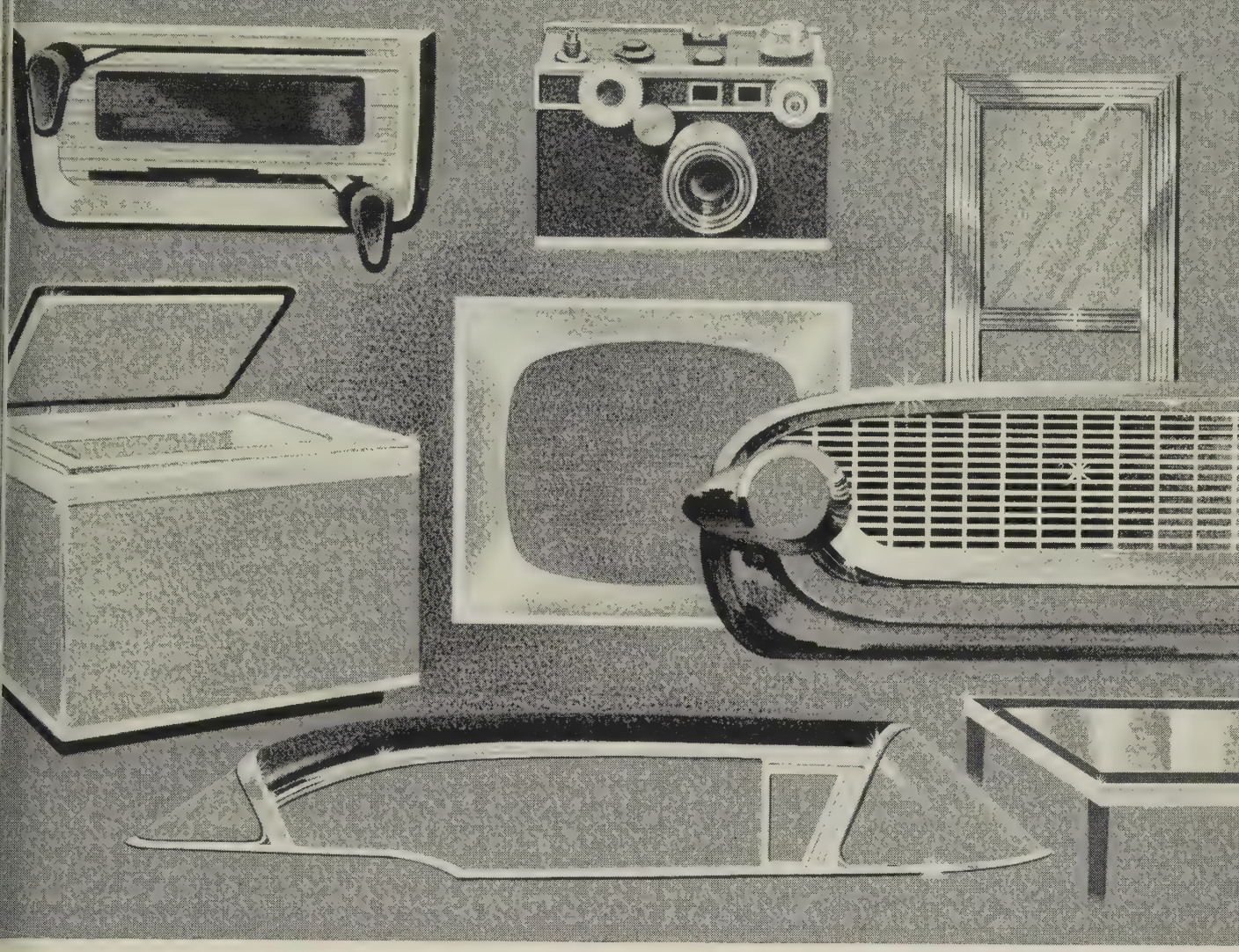
American Steel & Wire Div., Cleveland, U. S. Steel Corp., promoted **Huber W. Hartman** to assistant general superintendent at the Cuyahoga Works. He is replaced as works superintendent at the American Works by **Frank A. Fink.**

William J. Borwick, assistant vice president, commercial, **United States Steel Supply Div.**, Chicago, U. S. Steel Corp., was promoted to manager of the Chicago district warehouse. He replaces **Clyde B. Colwell Jr.**, now manager of the Cleveland district warehouse. Mr. Colwell succeeds **William R. Holmes**, made manager of the Newark, N. J., warehouse to succeed **W. J. Norman**, retired.

Bruce R. Kelly was made Chicago branch manager for **Colson Corp.**, subsidiary of Great American Industries Inc.

Barry Controls Inc. appointed **Maury Bureau** manager of its newly opened Barrymount sales office in Detroit.

Jackson K. Lightfoot was appoint-



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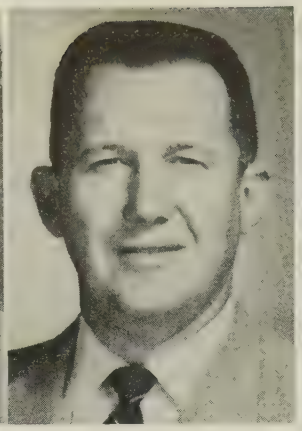

JOHN F. VAN DAM
Peerless Pump works mgr.

E. A. HARRIS
Revere Copper sales post

ed chief engineer, missile products division, **Beckman & Whitley Inc.**, San Carlos, Calif.

George C. Johnson was elected president and general manager, **Rehnberg-Jacobson Mfg. Co.**, Rockford, Ill.

John F. Van Dam fills the new post of Los Angeles works manager, **Peerless Pump Div.**, Food Machinery & Chemical Corp. He was production manager.

Weldon D. Willes, assistant to the president of **Rockwell Mfg. Co.'s** LFM Div., Atchison, Kans., was named general manager of the company's new valve plant, now under construction at Kearney, Nebr. **Fred J. Langtry**, assistant works manager of the Oakland, Calif., plant, was promoted to works manager at Kearney.

James C. Witt was elected president of **Witt Cornice Co.**, Cincinnati. He succeeds his father, **J. Wilber Witt**, who becomes chairman.

Maurice Nelles was elected vice president-engineering, **Crane Co.**, Chicago. He was director of diversification and research development for Technicolor Corp. He previously was director of research for Borg-Warner Corp., and vice president of its Petro-Mechanics Div.

John Baur was made director of engineering and research for **Binks Mfg. Co.**, Chicago.

Clifford F. Messinger was promoted to assistant general manager of **Chain Belt Co.'s** general road machines division at Niles, Ohio.

E. A. Harris was made manager of aluminum and pig ingot sales for **Revere Copper & Brass Inc.**, New York.

W. E. Dobbins was appointed director of the Washington office of **Dresser Industries Inc.**, the position formerly held by the late **Gen. Urban Niblo.**

Thomas D. West was appointed manager-shop operations for the Everett, Mass., steel foundry of **General Electric Co.'s** foundry department. He was executive vice president of West Steel Casting Co.

Tom R. Ragland was appointed executive vice president of **Union Carbide International Co.**, New York, division of Union Carbide Corp. He was vice president in charge of International's chemicals and plastics.

Milton F. Kent was made manager of apparatus product sales for **General Electric Co.'s** user industries sales department. He is at New York.

Ward Dickover was elected vice president-operations, **K. W. Battery Co. Inc.**, Skokie, Ill. He was chief engineer, industrial division, Gould National Batteries Inc.

Jay D. Sherman was made eastern sales manager, **Reed - Prentice Corp.**, Worcester, Mass., subsidiary of Package Machinery Co. He was New York district manager.

Charles F. Lloyd Jr. was appointed assistant general sales manager, **Fort Duquesne Steel Co.**, Pittsburgh. He joined the company a year ago as manager-aluminum products following ten years with Aluminum Co. of America.

Frederick H. Greene Jr. was elected vice president, **National Research Corp.**, Cambridge, Mass. He was director, commercial development department.

Thomas H. Locke Jr. joined **Phoenix Mfg. Co.**, Joliet, Ill., as manager of the steel mill division.

Norton Co., Worcester, Mass., created two new sales positions: **Robert Cushman** was made manager of marketing services; **W. Alexander McCune Jr.**, manager of field sales.

Donald P. Lamb was made supervisor, field sales and engineering, a new post at **Detroit Power Screwdriver Co.**, Detroit, subsidiary of Link-Belt Co.

Paul L. Jarvis was appointed director of sales promotion and marketing, **Uhrden Inc.**, Dennison, Ohio.

OBITUARIES...

Milton F. Young, 70, retired sales manager, **Carborundum Co.**, Niagara Falls, N. Y., died Oct. 25.

Leon Chenman, president, **L. Chenman Inc.**, Norfolk, Va., died Oct. 25.

Russell G. Smith, 68, president, **F. H. Smith Mfg. Co.**, Chicago, died Oct. 31.

Herbert S. Simpson, 73, chairman, **National Engineering Co.**, Chicago, died Nov. 3.

Edgar O. Landstrom, 58, secretary, **Sundstrand Machine Tool Co.**, Rockford, Ill., died Oct. 31.

Charles B. Long, 74, president, **Champion Blower & Forge Co.**, Lancaster, Pa., died Nov. 1.

Frederick Feinburg, David Feinburg Co., Medford, Mass., died Oct. 31.

William P. Myers, 56, vice president, **Induction Steel Castings Co.**, Detroit, died Oct. 31.

Steel Firms Merge

Superior Steel becomes division of Copperweld, extending its product diversification

COPPERWELD Steel Co., Pittsburgh, has acquired strip steel rolling facilities through a merger with Superior Steel Corp., Carnegie, Pa. Following ratification by stockholders of the consolidation, Carl I. Collins, formerly president of Superior, was named vice president of Copperweld in charge of the Superior Steel Div.

Superior specializes in stainless and alloy steels, spring steel, and clad metal. Its annual capacity is rated at 115,000 tons of hot-rolled strip and 80,000 tons of cold-rolled strip. The firm has no basic steelmaking capacity.

Facilities — Copperweld's seven electric arc furnaces at its Steel Div., Warren, Ohio, have an annual capacity of 660,000 tons. Rolling capacity includes 508,000 tons of hot-rolled products. This includes 403,000 tons of bars and 50,000 tons of blanks, tube rounds, or pierced billets for seamless tubing at Warren and 55,000 tons of wire rods at its Wire & Cable Div., Glassport, Pa.

Capacities for producing other finished steel products include: 55,100 tons of cold finished bars at Warren; 43,000 tons of seamless tubing and 8400 tons of electric-weld tubing (51,400 tons of mechanical tubing) at its Ohio Seamless Tube Div., Shelby, Ohio; and 55,000 tons of plain (steel and copper) wire and 7500 tons of wire fabric at Glassport.

Forms Anchor Fasteners

Connecticut Screw & Rivet Co., Waterbury, Conn., formed a subsidiary, Anchor Fasteners Inc., to make a full line of industrial fasteners. Production facilities will be established in Waterbury and Cleveland.

Installs Spinning Lathe

Hanson Bros., Whittier, Calif., has installed in its No. 1 plant a spinning lathe with a total swing of 156 in. and capable of forming up to ⅜-in. thick stainless steel. It is being used to produce large diameter fuel cell closures for several guided missile programs. Turning equipment for fabrication of large diameter spinning mandrels also has been added to the firm's facilities in conjunction with the new lathe.

Clark-Cooper Reorganized

Clark-Cooper Co. Inc., Palmyra, N. J., has been reorganized under the management of Rex A. Taylor. The firm makes steam and air horns. To handle a line of metering pumps, the company has formed the C C Pump Div.

Enters Electronic Field

Holex Inc., Hollister, Calif., is a new engineering and production organization entering the field of explosive ordnance and related devices. Products include igniters for solid and liquid rocket engines, pressure cartridges, explosive trains, electrically operated initiators, and thread-in type glass-to-metal seals. Mechanical and electronic parts and assemblies required for integrating these components to their proper functions in missiles, aircraft, and industrial equipment will be made on a custom engineering basis. E. J. Stecker is president of the organization.

Sealol Acquires Gage Line

Sealol Corp., Providence, R. I., organized an Acra-Ment Instrument Div. to manufacture a line of precision indicating gages. This results from Sealol's recent purchase of the Myer Corp.'s indicating gage line.

Tappan Stove Diversifies

Tappan Stove Co., Mansfield, Ohio, is embarking on a broad program of diversification and expansion. The first step will be purchase of Champion Molded Plastics Inc., Bryan, Ohio, supplier of plastic components for the refrigeration and air conditioning industry. The firm also makes plastic parts for automobiles, radio and television receivers, and a line of plastic toys and hardware. Tappan Stove also proposes to change its name to Tappan Co.

J&L Operating New Plant

Jones & Laughlin Steel Corp.'s Container Div., Pittsburgh, will continue to operate at full capacity its newly purchased plant in Lebanon, Ind. The plant was purchased from the Geuder, Paeschke & Frey Co., manufacturer of galvanized ware, ironing tables, and other consumer products.

Organizes Conveyor Unit

National Engineering Co., Chicago, organized a subsidiary, National Air Conveyor Corp. The new firm will design and manufacture pneumatic conveying equipment. Officers include: President, B. L. Simpson; executive vice president, R. L. McIlvaine; chief engineer, J. L. Kauffman; and sales manager, G. T. Dupre.

Buys Gem Clay Forming Co.

Gem Clay Forming Co., Sebring, Ohio, has been purchased by a group headed by J. Harrison Keller, president of Salem China Co., Salem, Ohio. The company will continue to produce refractories and refractory materials. Officers are: President, Mr. Keller; secretary-treasurer, Evan W. Morris; plant manager, L. E. Bryan; sales representative, L. D. Jones. C. K. Wiley, former president, will engage in sales promotion.

Bids for Diversification

Republic Aviation Corp., Farmingdale, N. Y., organized a Commercial Contracts Div. to provide engineering, development, and manufacturing services to industry generally and as a supplier to other aviation companies and allied industries. The firm previously had produced solely for the military. Republic is seeking contracts in machining, turning, grinding, boring, stretch forming, hot forming, stamping, fusion, resistance and flashwelding of metals, fabrication of parts, assembly, tool and die making, and electrical and electronic design and assembly. Republic also is a leader in advanced techniques of working and fabricating titanium. Other

(*Please turn to Page* 140)

Westinghouse Life-Line "A" motors helped save $13,500 in olive pitting operation...

at Bell Packing Corporation Berkeley, California

Continuously driving brine pumps for olive-pitting operation, Westinghouse motors have helped cut production cost, improve product quality

"Westinghouse Life-Line 'A'® motors make possible the profitable functioning of the new pitting room in our olive canning plant," states Mr. William Carlson, Plant Superintendent at Bell Packing Corporation, Berkeley, California.

Mechanizing this operation has increased production 15% and released a good share of the normally required manpower for use elsewhere in the plant. In three years, Bell Packing reports a saving of $13,500. In designing the area, Bell Packing Corporation considered the choice of motors for the brine pumps the most serious problem. Westinghouse 1 hp, Life-Line "A" motors were chosen on their record of long-term, trouble-free life under the toughest conditions.

POWER-UP with the motor designed to meet modern industry's needs. For complete information, call your Westinghouse sales engineer, or distributor. Or, write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22058

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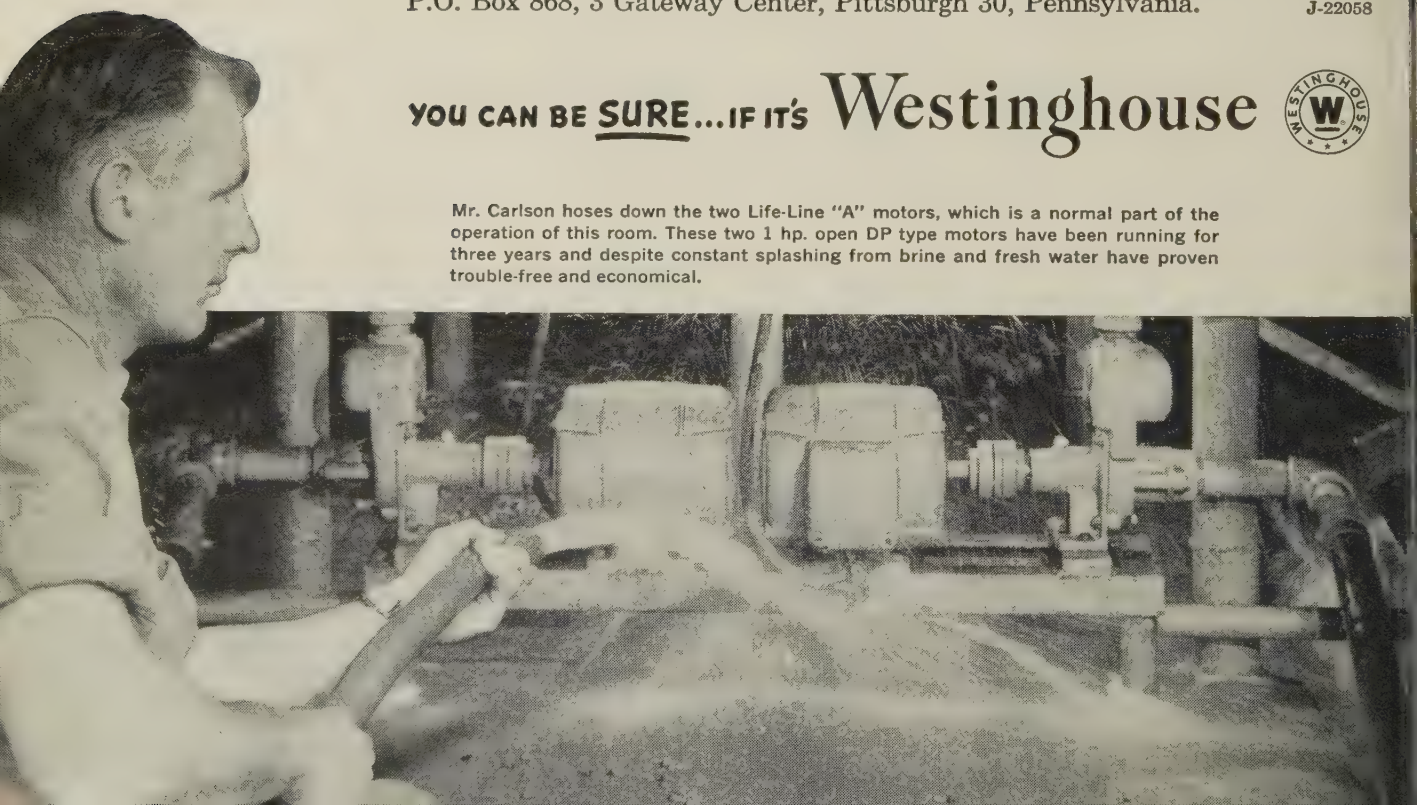

Mr. Carlson hoses down the two Life-Line "A" motors, which is a normal part of the operation of this room. These two 1 hp. open DP type motors have been running for three years and despite constant splashing from brine and fresh water have proven trouble-free and economical.

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WHEELOCK, LOVEJOY & COMPANY, INC.

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(*Concluded from Page* 137)

recent Republic advances are in chemical milling production and automatic digital milling (numerically controlled), and metal-to-metal and metal-to-honeycomb bonding.

Buys Testing Equipment

New wire and cable testing equipment has been installed at Rome Cable Corp., Rome, N. Y. It will increase the company's testing capacity as well as reduce its material handling requirements and labor costs. The equipment will be used to test all cable types presently manufactured without extensive preparatory setup work. Other advantages: More efficient testing and greater safety.

CONSOLIDATIONS

Armco Steel Corp., Middletown, Ohio, will acquire the **Union Wire Rope Corp.**, Kansas City, Mo., subject to approval of Union's stockholders. Armco plans to operate the property as a subsidiary and continue the manufacture of high carbon wire, wire rope, and other high carbon wire rope products.

L. A. Young Spring & Wire Corp., Detroit, purchased **Utility Metal Products Inc.**, Pasadena, Calif., and its subsidiary, **Utility Aircraft & Metal Products Ltd.**, Granby, Que. Utility makes complex structural parts for aircraft and missiles. Officers of Young's new division are: President, J. C. Thomas III; vice president, B. F. Thomas; secretary-treasurer, Harold M. Bice; assistant treasurer, Fred H. Bice.

Crucible Steel Co. of America, Pittsburgh, acquired full ownership of **Rem-Cru Titanium Inc.**, Midland, Pa., formerly jointly owned by Crucible and Remington Arms Co. Inc., Bridgeport, Conn.

Stockholders of Geo. D. Roper Corp., Rockford, Ill., have approved the sale of its wholly owned subsidiary, the **Geo D. Roper Corp. of Delaware**, and the parent company's gas range and gas dryer business to **Florence Stove Co.**,

Electrolytic tinning lines maintain highest product quality through

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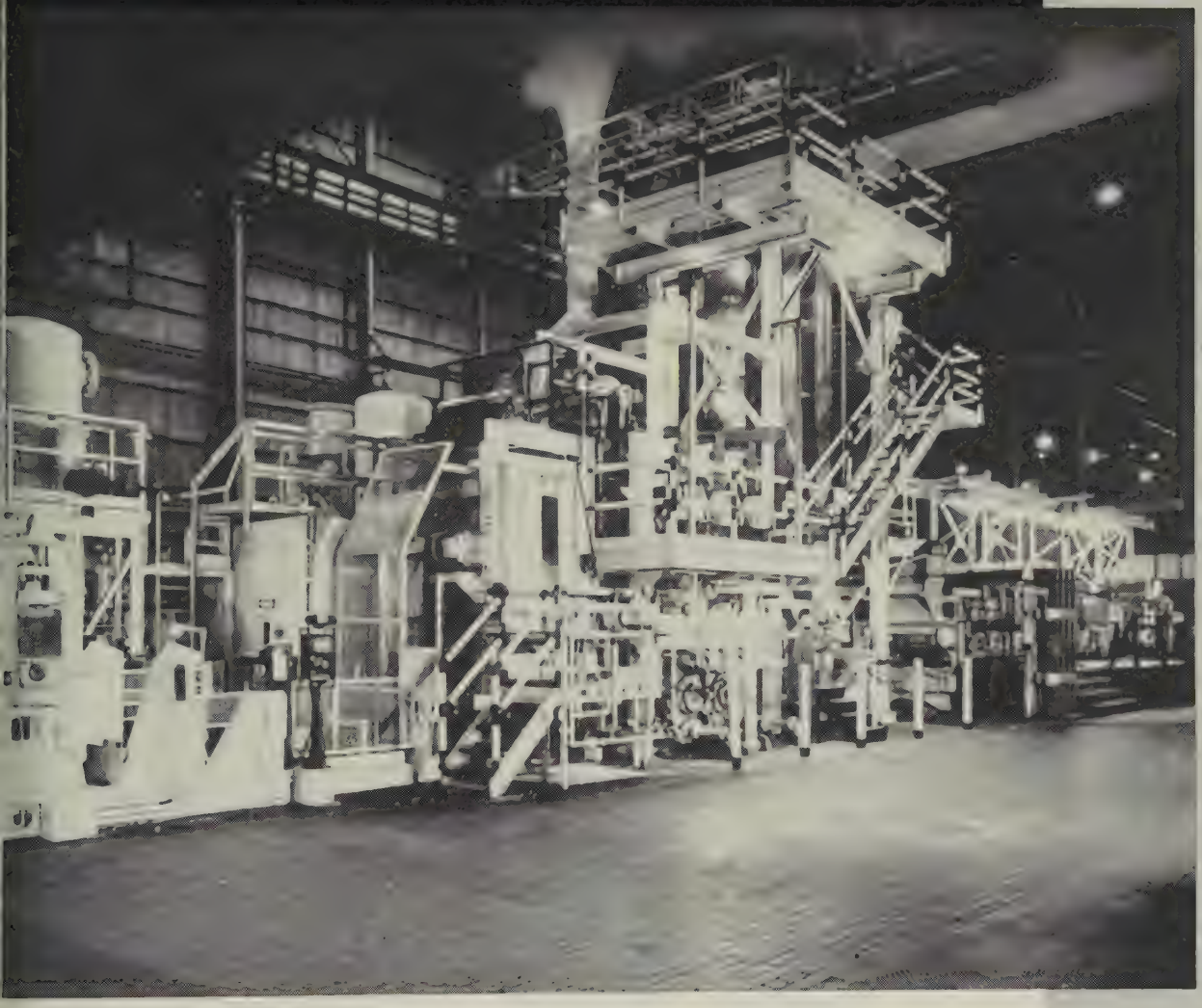

VIRTUALLY since the inception of the idea, Wean has played a major role in the successful development and manufacture of equipment for the production of tin plate by the Electrolytic process. Wean-engineered tin plate lines have established outstanding production records, but of equal importance, these same lines have continuously maintained highest product standards to meet industry's ever increasing demand for quality . . . in quantity.

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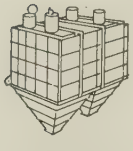
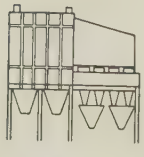
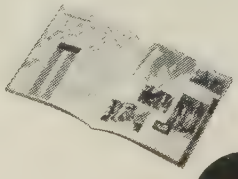
BUELL CYCLONE



"SF" ELECTRIC PRECIPITATOR



PRECIPITATOR-CYCLONE COMBINATION



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Chicago. Stanley H. Hobson, president of the Geo D. Roper Corp. becomes chairman of Florence Stove. Ranges will be manufactured and assembled in the Florence plant at Kankakee, Ill., and (for the present) at Rockford.

ASSOCIATIONS

Alfred M. Cox, Pittsburgh Commercial Heat Treating Co., was elected president of the **Smaller Manufacturers Council**, Pittsburgh. Mr. Cox also heads the J. P. Devine Mfg. Co., Pittsburgh Wire Form & Mfg. Co., and Pride Mfg. Co.

American Production & Inventory Control Society has been organized. Mailing address is P. O. Box 13, Kokomo, Ind. Officers are: President, M. W. Maddox, Mueller Brass Co., Port Huron, Mich.; vice president, R. E. Carruth, Acushnet Process Co., New Bedford, Mass.; secretary, Don Burkhart, Haynes Stellite Co., Kokomo; and treasurer, Louis Norheimer, Tube Turns, a division of National Cylinder Gas Co., Louisville.

Rudolph Cubicciotti of L. Sonneborn Sons Inc., New York, was elected president of the **National Lubricating Grease Institute**, Kansas City, Mo.

L. H. LaMotte, International Business Machines Corp., New York, was elected president of the **Office Equipment Manufacturers Institute**, Washington.

H. A. Ford, Geneva Metal Wheel Co., Geneva, Ohio, was elected president of the **Caster & Floor Truck Manufacturers' Association**, Chicago. W. R. Thomas, Thomas Truck & Caster Co., Keokuk, Iowa, was elected vice president.

F. E. Dunn, Turbine Pump Div., Worthington Corp., Harrison, N. J., was elected president of the **Vertical Turbine Pump Association**, Arcadia, Calif. Harold Miller, Johnstown Pump Div., Youngstown Sheet & Tube Co., Youngstown, was elected vice president. B. A. Tucker, former sales manager (re-

red), Peerless Pump Div., Food achinery & Chemical Corp., San se, Calif., was appointed manger of the association in addion to his capacity as secretary-reasurer.

NEW ADDRESSES

Precision Tool Sales Co. moved o a new plant at 6812 S. Western ve., Los Angeles, Calif. This oubles the firm's production caacity for tool engineering and uality control products.

Electric Steel Foundry Co., Portnd, Oreg., moved into a new ranch office and warehouse at 940 Grape St., Denver 7, Colo. ffice manager is Roy Orchard.

Axelson Mfg. Co., Los Angeles, noved its engine lathe production perations from that city to Clearng Machine Corp.'s plants in Chiago and Hamilton, Ohio. Both ompanies are divisions of U. S. ndustries Inc., New York.

Bostitch (stapling machines, stales, and wire stitchers) is now in ts new factory on South County rail, East Greenwich, R. I.

Harvey Aluminum, Torrance, alif., moved its sales engineering ffices in San Diego, Calif., to 2108 ifth Ave. Head of the office is harles Hayes, district sales manger.

Technique Associates Inc., manufacturer of temperature measuring nd indicating instruments, moved ts general offices and plant to arger quarters at 1413 N. Cornell ve., Indianapolis 2, Ind.

Greenfield Tap & Die Corp., reenfield, Mass., moved its New ork office and warehouse to 32 orth St.

Ferguson ... e Corp. of In... er quarters at ...ustrial Court, ... company, a ...rsal Match ...nakes roller ...d transfer ...d produc...

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OUTSTANDING PERFORMANCE—Forms a film that is an integral part of the metal itself. Can't flake, chip or peel. Takes paint firmly on initial application, and the bond lasts. Even protects areas scratched in use.

LOWEST COST—You have only minimum equipment cost, no special racks, high speed operation, lower overall handling costs.

CHOICE OF APPEARANCE—Clear coatings that retain metallic lustre to dark, maximum protection coatings. A variety of colors is available by dyeing.

IRIDITE #14 and #14-2 (Al-Coat) for ALUMINUM

Two specially formulated finishes that give you maximum latitude in aluminum treatment. Both provide excellent corrosion protection and paint base. Iridite #14-2 is an improved product that allows greater flexibility in operation and coating thickness and produces the optimum in corrosion protection.
Either coating provides corrosion resistance superior even to complicated electrolytic treatments in a fraction of the time. These coatings also offer many other valuable characteristics: they have low electrical resistance, they aid in arc-welding, provide a good base for bonding compounds, have no effect on the dimensional stability of close-tolerance parts. Final appearances ranging from clear through yellow iridescence to full brown can be obtained. By dyeing, you can produce red, green, blue, orange or yellow finishes.

IRIDITE #15 for MAGNESIUM

Produces a protective, paint base film with corrosion resistance at least equal to that obtained from long, high-temperature dichromate treatments in a fraction of the time and at room temperature. The appearance of the coating can be varied from light brown to dark brown and black.

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SEE FOR YOURSELF WHAT IRIDITE CAN DO . . . SEND SAMPLE PARTS FOR FREE PROCESSING. Look at the results, test the protection, evaluate the savings. Also write for handy Reference File of the most complete data published on chromate conversion coatings. Or, for immediate information, call your Allied Field Engineer. He's listed under "Plating Supplies" in your classified phone book.

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West Coast Licensee—L. H. Butcher Co.

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PROTECTION of Stainless Steel *here*—where it's needed.

STRENGTH and **ECONOMY** of Carbon Steel *here*—where corrosion isn't a factor.

- Stainless and backing plates inseparably bonded
- Thickness of stainless steel as specified—from 5% to 50% of total plate thickness
- Wide range of stainless and carbon steel specifications available

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STEEL

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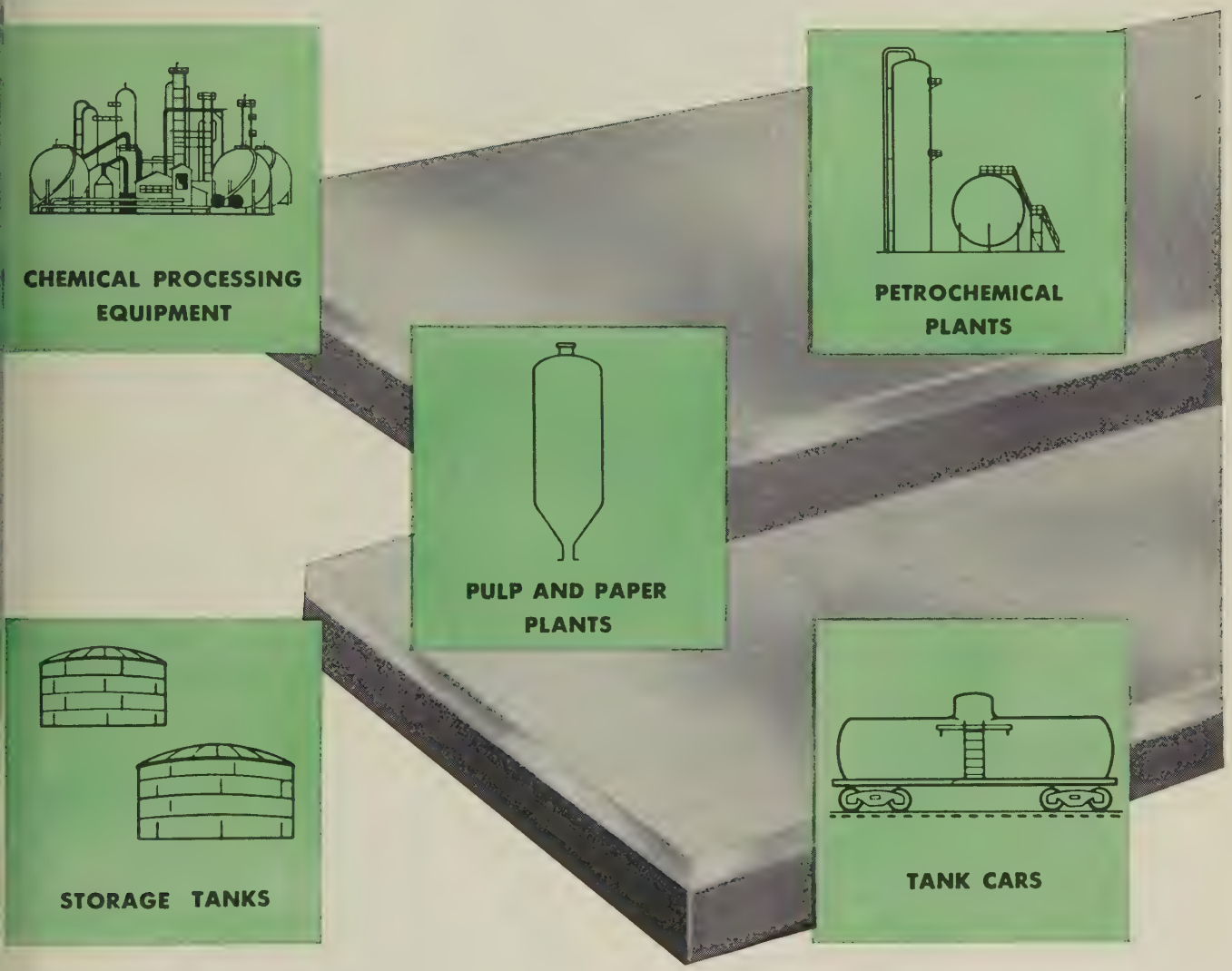
Stainless-Clad steel

USES FOR STAINLESS-CLAD



For these . . . and many other applications where *low-cost* protection against corrosion or product contamination is a vital requirement . . . manufacturers are specifying Claymont Stainless-Clad Plates, Heads and Fittings. Why not bring *your* problem to us? Just contact our nearest sales office today.

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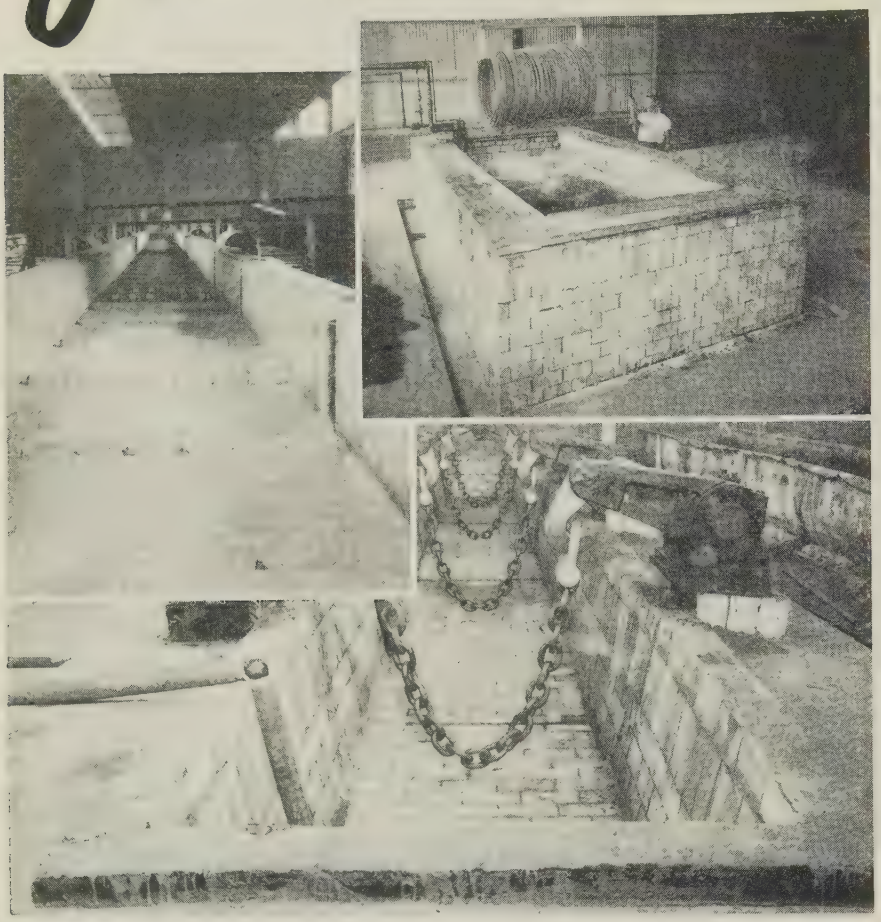
They Looked... and Chose

Atlas FOR THEIR CORROSION-PROOF PICKLE TANK INSTALLATIONS



These modern processors of metals pictured above chose Atlas corrosion-proof cements and know-how for the construction of their pickling installations. Their decision was based on Atlas's long recognized experience in the field of Corrosion-Proof construction. From on-the-spot technical advice through complete installation facilities, Atlas can carry the job from beginning to end.

Regardless of your requirements, Atlas is prepared to design and construct any type of installation from the smallest batch pickler to the largest continuous pickling line.

Pickling tanks of Atlas construction reduce down-time to a minimum because Atlas corrosion-proof cements, coatings and linings are designed to handle the rugged abuse of modern pickling.

Look... and you will choose Atlas corrosion-proof construction for your next pickling installation.

Write for your copy of Bulletin CC-3 for complete information on the Atlas line.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

(*Concluded from Page* 145)

tion and automation. The building vacated in Ferguson will be used by Universal's expanding Armament Div. to manufacture guided missile launchers.

Lamson Mobilift Corp., Portland, Oreg., moved its Service Dept. headquarters from Chicago to the factory location in Portland. The firm makes industrial trucks. Floyd M. Mayse is in charge of the department.

Production Machinery Corp., Mentor, Ohio, moved its engineering and sales offices to enlarged quarters at Maple Street and Nickel Plate Railroad, that city.

Farrel-Birmingham Co. Inc., Ansonia, Conn., moved its Akron office to 665 W. Market St.

NEW PLANTS

Homestake Mining Co., San Francisco, awarded a $10-million contract to the Utah Construction Co. for the erection of a uranium ore processing mill near Grants, N. Mex. Daily capacity will be 1500 tons.

NEW OFFICES

Carpenter Steel Co., Reading, Pa., opened a new and larger mill branch warehouse and office at 4501 James Place, Melrose Park, Ill. It is the midwestern headquarters for the company and its Alloy Tube Div.

Sentry Co. will move into its new office building before the year-end. It adjoins the company's main plant for manufacturing electric furnaces in Foxboro, Mass.

Peabody Engineering Corp., New York, opened a district office at 400 Shadeland Ave., Drexel Hill, Pa. It will be under the management of Henry J. Schmidt who will handle oil, gas, and combination fuel burners; automatic package burners; kiln burners; fuel oil pumping and heating sets; and direct fired, air heater furnaces.

Technical Outlook

BOOST IN POTENTIAL— Look for the application of more aluminum investment castings in aircraft. Arwood Precision Casting Corp., New York, is blazing the trail. It's guaranteeing tensile and yield strengths to be 50 per cent above aircraft quality. Specimens cut from any part of a casting are said to have these properties: Tensile, 34,000 psi; yield, 25,000 psi; and elongation, 3 per cent. In critical areas, these properties are said to be possible: Tensile, 38,000 psi; yield, 27,000 psi; and elongation, 5 per cent.

SMALL MAGNETS— Permanent magnets with diameters as small as a human hair have been made by the National Bureau of Standards. The material, an alloy called "Cunife," consists of about 60 per cent copper, 20 nickel, and 20 iron. It can be drawn cold instead of requiring casting or sintering into a desired shape (like most highly coercive magnet materials). Such ductility suggested its use for minute magnets.

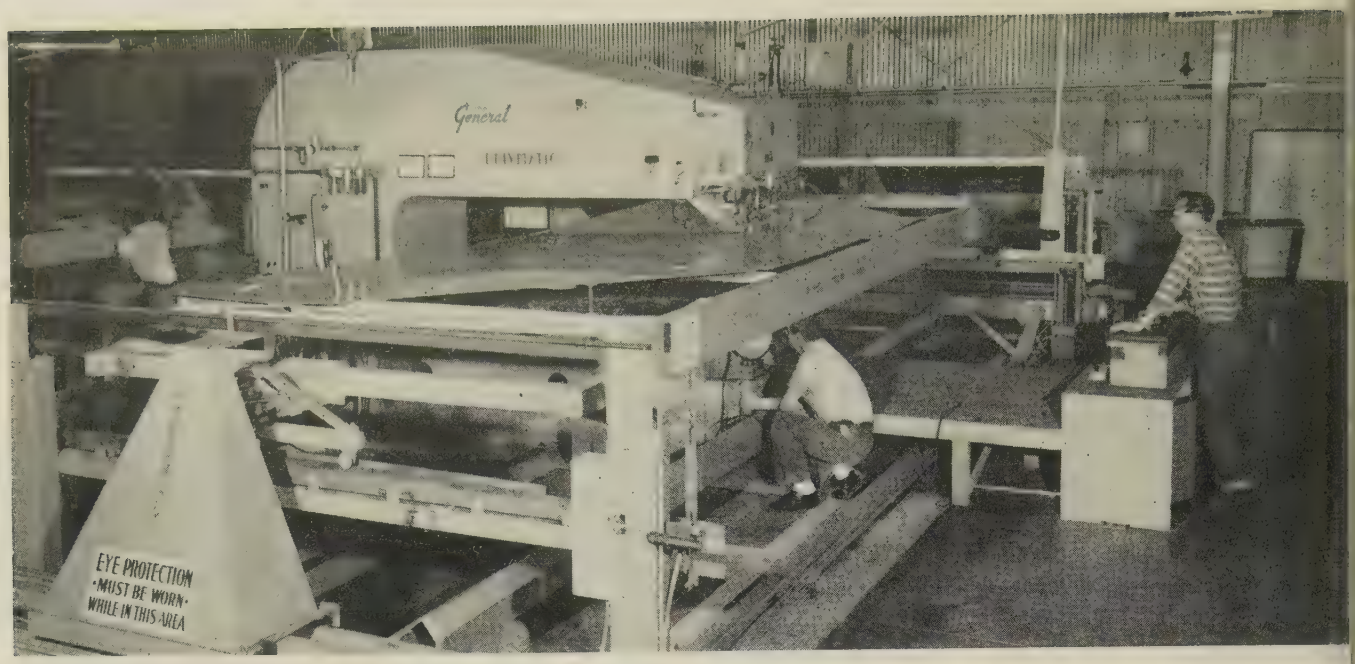
HARD SURFACING IDEA— Small hexagonal plates of cemented tungsten carbide assembled in a continuous pattern on an adhesive, glass fiber backing provide flexible strips for application to flat or curved surfaces. The adhesive backing holds the small plates in position while they are being soldered, brazed, or bonded with epoxy adhesives. Called Kenplate, the new material was announced by Kennametal Inc., Latrobe, Pa., at the National Metal Exposition in Chicago.

MOLYBDENUM DISULFIDE— When a lubrication problem involves oscillation, reciprocation, sliding, or shock loading, MoS_2 lubricants can be justified, says Elwin E. Smith, manager of chemical sales, Climax Molybdenum Co., New York. Low friction, filming properties, and high load carrying capacity enable moly sulfide to sustain lubrication under such critical conditions even after the base lubricant has been squeezed out or wiped away.

NEW HI-TEMP CERAMIC— A silica ceramic that can be easily fabricated into shapes by dry pressing or slip casting has been developed at the Georgia Tech Engineering Experiment Station. It is expected to find greatest use in applications requiring high resistance to thermal shock, such as metal casting molds, refractory brick, nozzles, and nose cones for rockets. The ceramic can stand 4500 to 5000° F for short times, say Tech engineers.

ALUMINUM FOIL— A new x-ray control system has cut down gage variations in the rolling of foil at the Permanente, Calif., plant of Kaiser Aluminum & Chemical Corp. The system handles thicknesses of 0.00025 to 0.00651 in. at speeds up to 3000 fpm. It continuously monitors the thickness of foil as it is rolled and supplies a corrective signal to maintain close tolerances. General Electric Co.'s Industry Control Dept., Roanoke, Va., built the control system.

SCHEDULED DOWNTIME— Production men at Ford's new Sterling, Mich., plant have programmed tool change time for five transfer machines. The machines do all the milling, drilling, and threading on Ford and Mercury front wheel spindles. To help them keep track of tool wear and speed up changing, the engineers are using Scully-Jones tool boards that count machine cycles and warn when a tool has made a predetermined number of cuts. The boards also hold preset tools that can be quickly inserted in spindles; so downtime is minimized.



With the old method (top) operator crouched to check rivet quality. He could miss as many as 12 rivets. New method (bottom) enables operator to keep closer check

TV 'Eyes' for Tough Jobs

Operator of automatic riveting machine formerly needed an assistant to look where he couldn't. A closed circuit television system improved speed and quality

A CLOSED circuit television system speeds the operation of an automatic riveting machine at the El Segundo Div., Douglas Aircraft Co. Inc., Santa Monica, Calif.

The machine installs "H" and "Z" section stringers in Skywarrior wing panels. Formerly, the job required an assistant who was stationed in an uncomfortable position under the panel.

Requirement—The machine automatically drills and countersinks a hole through the panel and stringer, inserts and sets a rivet, mills the head flush with the skin, and cycles to the next location. The operator must watch carefully to insure that the drill, counter sink, rivet sets, and milling cutte are doing their jobs. He stops th machine when damage appears, an he must be able to see underneat the panel to check the alignmen of stringers, or a poorly set rive

He's 8 ft from the rivet anv and can't get closer without leavin his control—hence an assistan was used. Fatigue reduced his ef ficiency. As many as a dozen ba rivets were set before he detecte the fault.

Material—With a closed-circui TV camera under the wing pane the operator can see the drill an rivet set location on a monito viewing screen next to his contro panel. A helper isn't needed.

The operator's view is improve because the camera can be posi tioned to pick up the first thre rivets off the anvil. The camer magnifies the image three time on the monitor screen.

production ideas

NO. 15 OF A SERIES

Photoetching Forms Thin Parts

Satisfied that their process has proved itself in the electronics industry, producers set their sights on other jobs in metalworking. Intricate, fragile parts are naturals

HOW WOULD you make a part that is 0.007 in. thick, 21 in. in diameter, and has about 500,000 tiny, perfectly tapered holes?

Television makers faced the problem a couple of years ago when they needed an aperture mask for color TV sets. They chose photoetching — a process that is old as the hills but still new to most of metalworking.

What Is It?—Like the Chem-Mill process (STEEL, June 3, p. 85), photoetching takes off metal with an acid. In both processes, a mask is used to make sure the metal comes off in the right places. But the similarity ends there.

Photoetching relies on a photographic image to control the contours of the part. The image is printed on coated metal.

What Does It Offer?—One limitation fairly well confines it to thin metal. It's practical only on sheets or strip 0.016 in. thick or less. (One expert told STEEL he'd be willing to try stock 0.020 in. thick on an experimental basis.)

Parts too intricate, small, or delicate for stamping are naturals. Irregular shapes, for example, are no problem. If the part can be outlined on a drawing, it can be photoetched—and complexity is handled with the same processing ease that goes with simple parts. In fact, it's on intricate parts, particularly those where some microprecision is involved, that photoetching will take its biggest strides. Although most parts will be flat, that's no restriction. Etched aperture masks are formed with a dome shape, so their contour matches

Four Steps to Finished Parts

DRAWING becomes

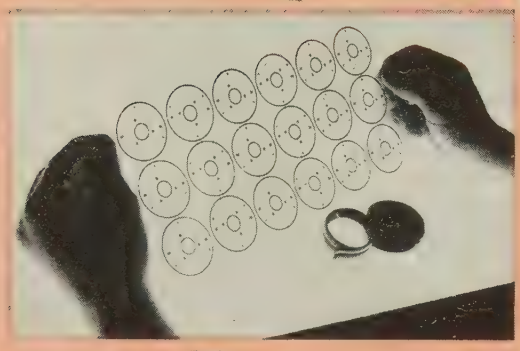
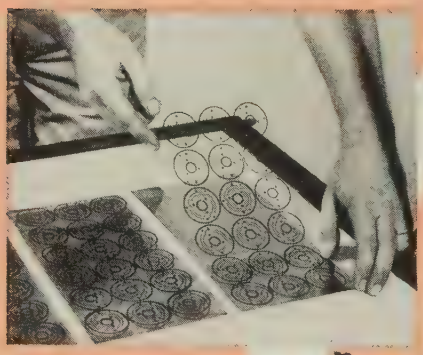


PHOTO IMAGE

that's printed on

SENSITIZED METAL



ACID ETCHED

FINISHED PARTS

Photos courtesy Randolph Co.

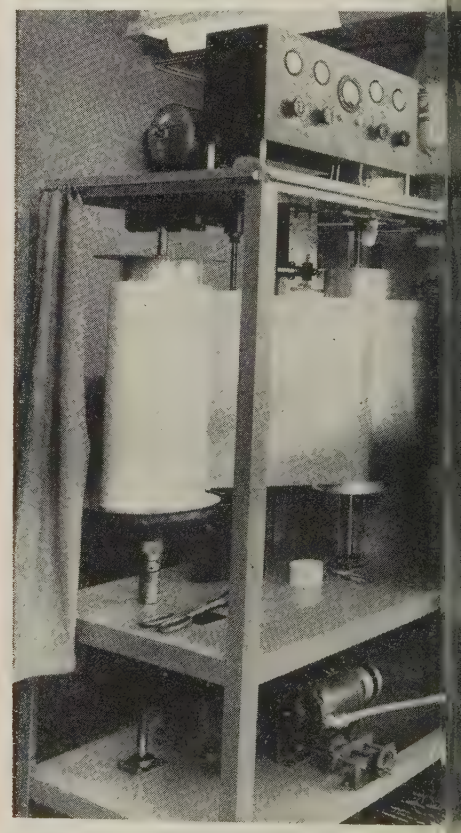
the parts of picture tubes.

The aperture mask for color TV illustrates size limitations pretty well. (See photo at top of Page 156.) The over-all size of that screen, about 21 in., is near the maximum. (It's limited by the available production equipment.) The holes are about 0.010 in. in diameter, and they're tapered. Getting that kind of hole pattern would be a headache with any other production technique.

Actually, these holes aren't the minimum. Superior Tube Co., Norristown, Pa. (the company has a new Photo-Forming Dept.), says the minimum hole diameter is 0.0015 in., but it must never be less than the thickness of the strip. There is no maximum hole size.

Precision — Tolerances can be held well within the range of most sheet metal parts. On over-all part dimensions, they'll be held to ±0.001 to 0.002 in. Holes with a maximum dimension of 0.025 in. can usually be held to ±0.0005 in.

Tolerances are influenced by production techniques, the alloy, strip thickness, and distance between



Metal strip emerges from the emulsion coating machine at Superior Tube's Photo-Forming Dept. After

holes in intricate patterns. Under special conditions, tolerances even closer than those cited may be possible.

Plusses—Etched parts are burr-free, eliminating the need for a second operation to clean up edges. Since the metal is not actually "worked," no stress patterns are set up, and there is no tendency for the parts to warp or distort.

Another advantage: There are no tools to wear. All parts come out of the etch the same size and shape. Also, the material can be annealed or full-hard, or any temper in between.

Lot Size—At the Randolph Co., Houston, photoetching is used to turn out geophone springs. (See illustrations, Page 154.)

The geophone is an electronic device used to prospect for oil. The flat springs are usually made of beryllium copper 0.003 to 0.012 in. thick. The material can be heated to a spring temper, and it has excellent etching properties. The springs are round, with a diameter of ¾ to 2¼ in.

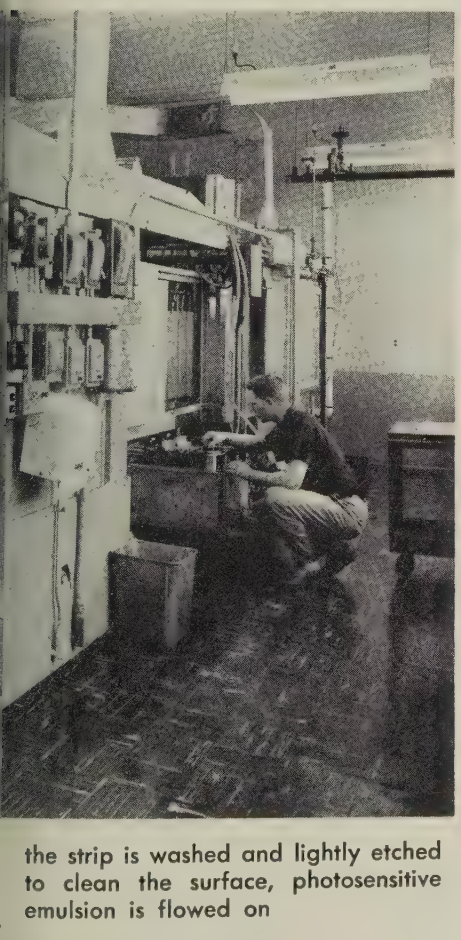
G. R. Hockmeyer, Randolph's vice president, says the designing of such a spring for a specific frequency is pretty much trial and error. Generally, proper design can be reached after one or two trials; but as many as ten modifications have been required. Such a method would be costly and time consuming if diework were involved.

Materials—Here is how Superior Tube rates them for the process:

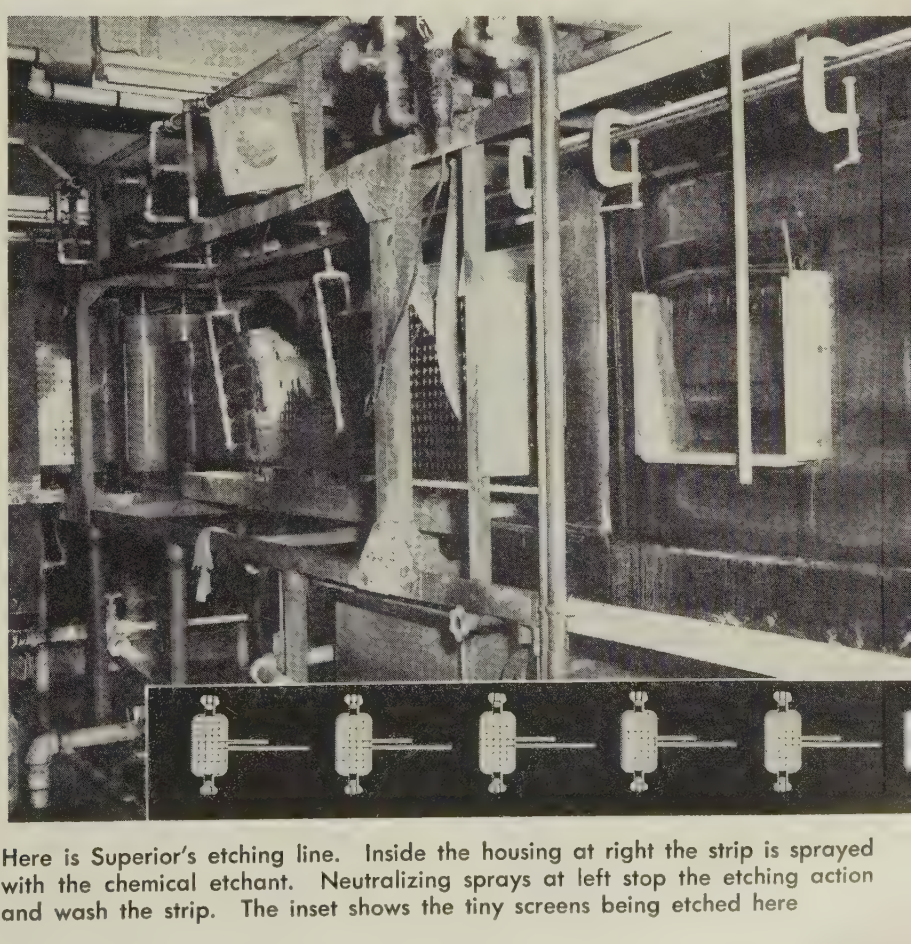
- Low carbon steels . . . easily etched.
- Medium and high carbon steels . . . accepted on an experimental basis.
- Stainless steels . . . austenitic (300 series) grades are easier to etch than the ferritic (400 series). Of the 400 group, AISI 430 seems to be the best.
- Copper-base alloys . . . among the best of all metals for etching are copper, brass, and bronze. Cupro-nickel alloys also are good. Beryllium copper is more difficult.
- Nickel and nickel alloys . . . some etch all right. Choice will depend on chemical and physical properties of the alloy.
- Aluminum and its alloys . . . most are easily etched. Grades 1100 and 3003 are widely used. Some high alloys require experimental work.
- Molybdenum . . . the pure metal is particularly easy to etch.
- Reactive metals . . . they usually are tough to etch, particularly titanium and zirconium. Their affinity for gases, such as nitrogen, hydrogen, and oxygen, normally requires special manufacturing controls.

How It Works? — The process starts with an accurate inked drawing of the part. On small parts, the drawing may be 15 to 20 times final part size. It is photographed, and the image is carefully reduced (where necessary) to the size of the part. A negative image of the part is used as a "template" for production.

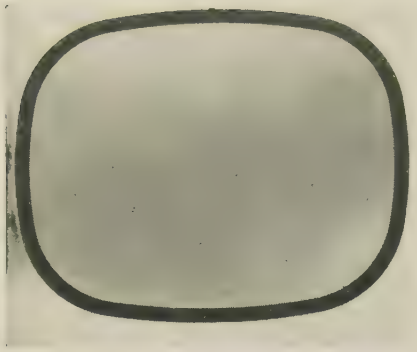
Since the drawing can be made many times actual size, errors can be controlled easily, and their magnitude is reduced as the actual-size image is produced. When the parts are small, several images are put on the same negative, so



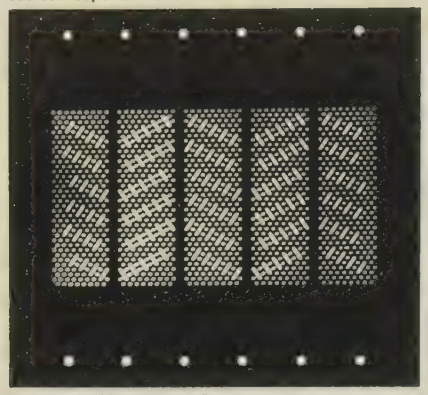
the strip is washed and lightly etched to clean the surface, photosensitive emulsion is flowed on



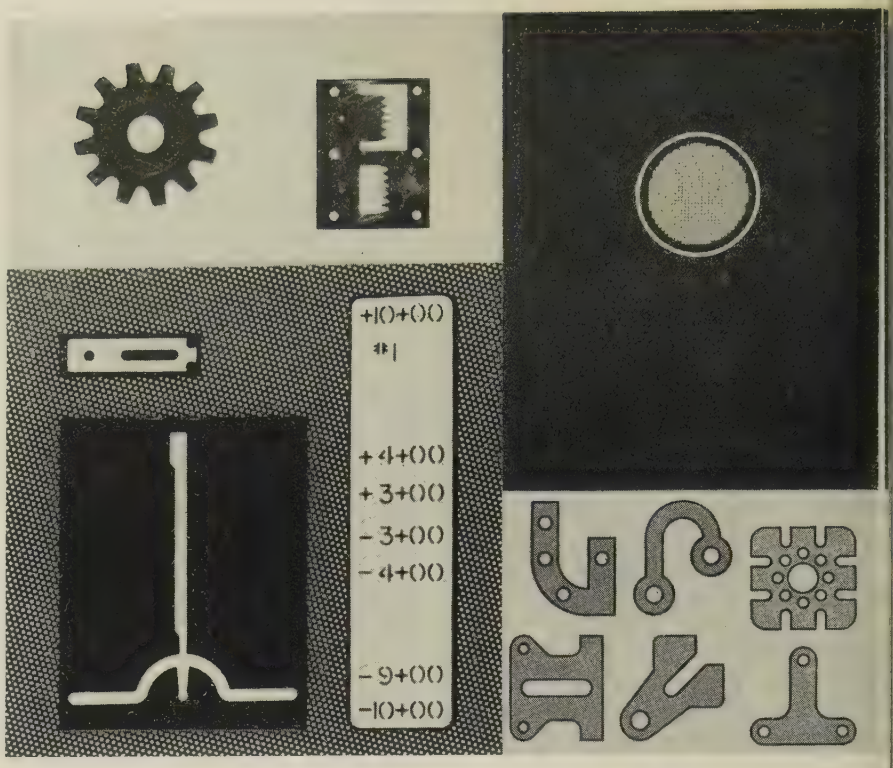
Here is Superior's etching line. Inside the housing at right the strip is sprayed with the chemical etchant. Neutralizing sprays at left stop the etching action and wash the strip. The inset shows the tiny screens being etched here



Source: Superior Tube Co.



Source: Buckbee Mears Co.



Sources: Randolph Co., Superior Tube Co.

The part at top left is an aperture mask for a color TV set. At lower left is a head screen for an electric shaver. The other photos above illustrate a range of parts that can be etched economically

that parts can be made in groups.

The image is laid on a metal sheet or strip that has been carefully washed, metallurgically cleaned with a light acid etch, and coated with a light-sensitive emulsion.

The part pattern is printed on the coated metal by exposing it to light. Where the emulsion coating is hit by the light, it hardens. When the metal is put through a developing process, the hard coating stays on. Wherever light didn't get to the coating, it comes off, leaving bare metal.

In the etching stage, acid eats away at the bare metal, leaving only the desired parts and, usually, the scrap remainder of the sheet or strip. In a final operation, the parts are cleaned; the hardened emulsion mask comes off; and the finished parts go to inspection.

Variations — Two basic techniques are being used. One, like that at the Randolph Co., is a batch method. The other, in use at Superior Tube and Buckbee Mears Co., St. Paul, is a line process. (Radio Corp. of America also has a line set up at its Lancaster, Pa., plant which turns out aperture masks.)

The batch technique probably is better adapted for short runs, pilot, and experimental work. The line process is for longer runs.

Both use the same fundamental etch technique, but in Randolph's batch processing, the part pattern is printed on only one side of sheets, and a photographic film is used as the template. In line processing, the design is printed on both sides of strip; the templates are two sheets of high quality photographic plate glass. The position of plates is set optically. Since etching takes place from both sides at the same time, parts are exposed to acid for a shorter time; there is less eating away of metal from under the masked sections (undercutting), and somewhat closer tolerances can be held. Tapered holes can be etched by providing a slightly larger opening in the coating on one side than on the other.

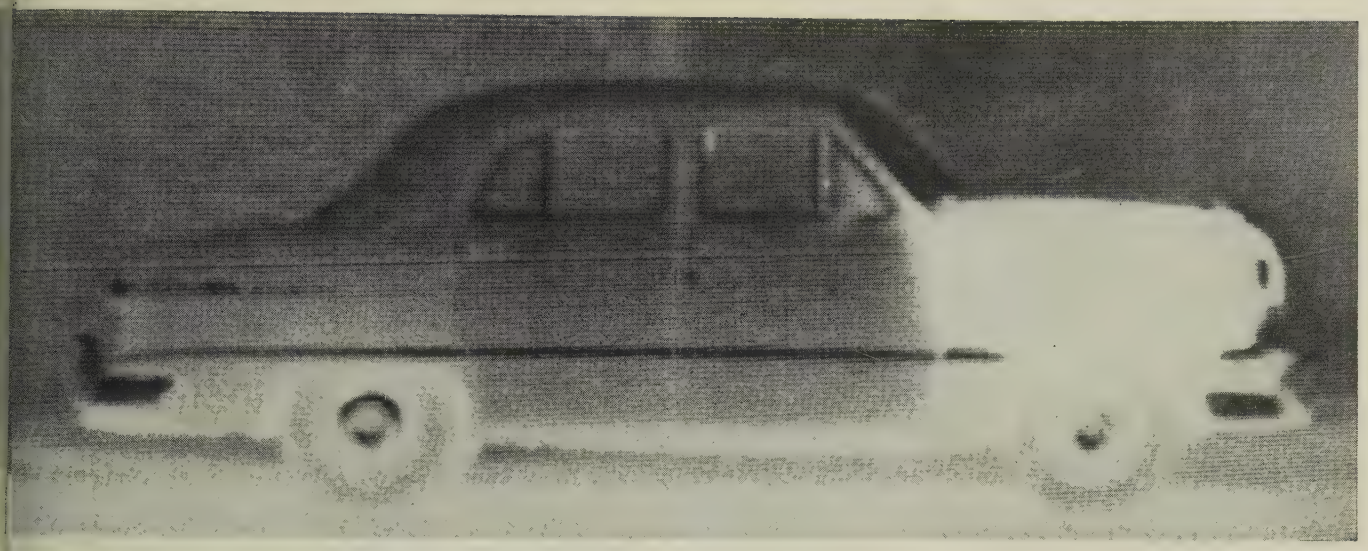
Potential — Photoetching has been proved on a wide variety of parts, but most work has been done for the electronics industry. The geophone springs and TV aperture masks are two of many such jobs.

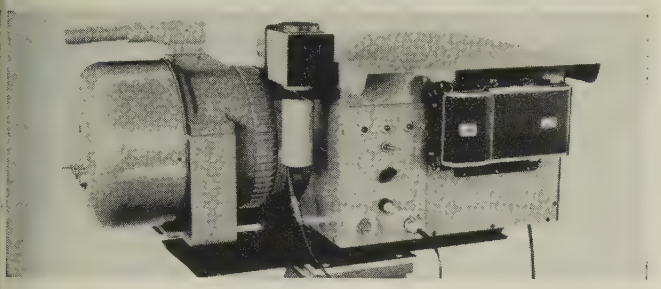
Advocates of the process are anxious to get into other industrial markets. Here's what R. H. Gabel, vice president, Superior Tube, has to say about it:

"Requirements of modern industry necessitate the use of small precision thin metal parts that often cannot be made by conventional methods. Many of these we feel can be produced more economically and at a higher quality level by etching. We are confident that these processes justify our substantial investment in new facilities and personnel. We anticipate rapid growth in the acceptance and in the markets for photoformed precision parts."

New Product—Buckbee Mears is etching one side of steel sheet, leaving an irregular pattern of sharp points and flats. The result is an abrasive that cuts nonferrous metals, wood, plastics and rubber. It's available in sheets, belts, discs, bands, cones, or sleeves.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*





Here is the infrared camera and an example of its work. Picture of auto shows hot hood; exhaust system has warmed the ground. Chrome seems cold because of low emissivity. Lines in picture are due to scanning action of light beam. Heat from car is focused on heat sensitive element. It controls light intensity as it scans film

Camera Detects Hot Spots

You can use it to discover such things as faulty welds, overheated machine parts and bearings, defects in castings and structures. Device is portable; it also works with cold objects

THE DEVICE in the above illustration is a new kind of camera which may save industry thousands annually.

Called the Barnes Far Infrared Camera, it measures and takes pictures of the heat emitted by any object. Here are a few of its uses:

- It identifies faulty welds, overheated machine parts, defects in castings and built-up sections. (It's being tested for inspection of honeycombs.)
- It shows up overheated elements in electrical equipment—switches, motors, transformers, cables.
- It reveals hot spots in refineries and pressure vessels. (Potential sources of trouble.)

How It Works—The camera detects infrared radiations and converts them into black-and-white photographs. Weighing about 100 lb, it has an infrared measuring system, a scanning attachment, and a visual camera.

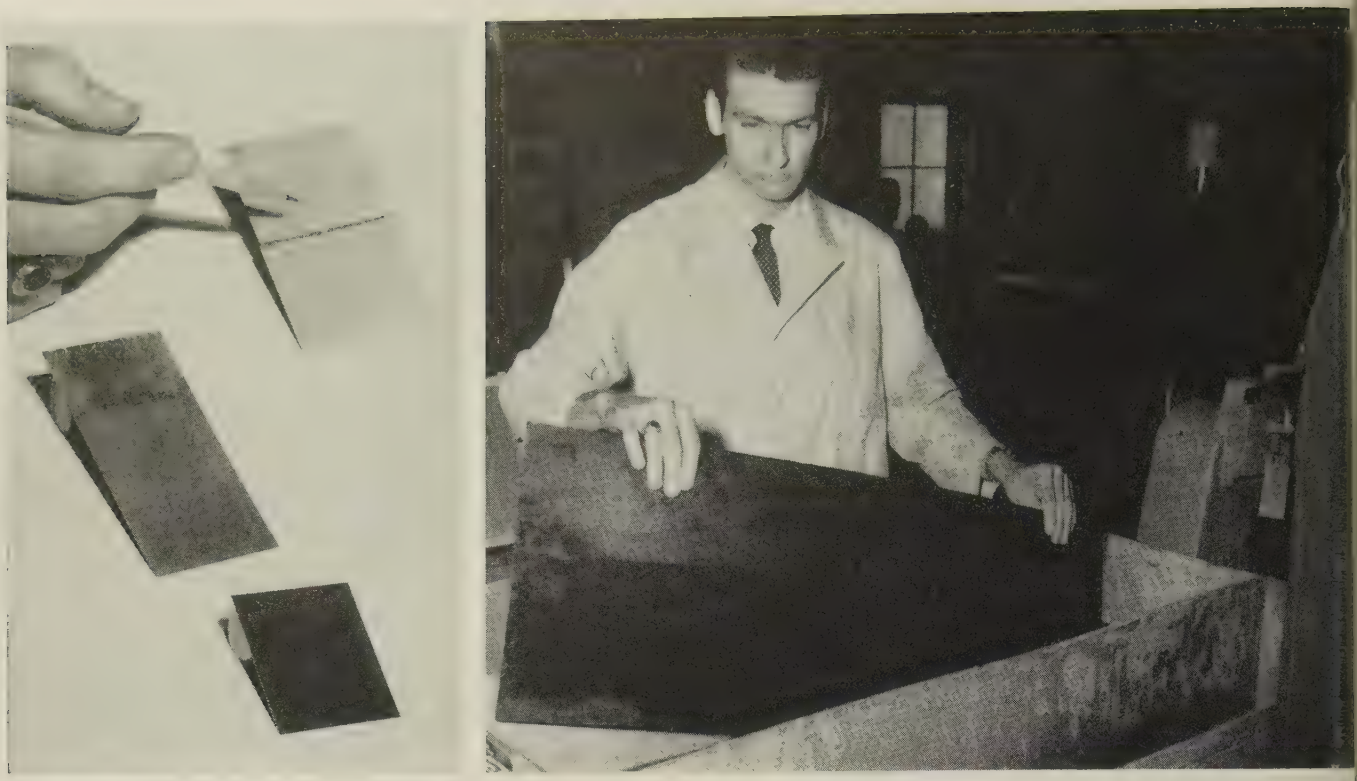
When an operator sights the camera, an internal mirror scans the viewing field much as an electron beam scans the picture in a TV camera. The heat detector senses variations in heat radiation. They modify or change the brightness of a light beam which simultaneously scans a visual film. By calibrating the intensity, heat can be measured in degrees Fahrenheit.

The completed picture looks striped. Light areas correspond to those which emit the most heat. Sensitivity is high—it notes differences as small as 0.07° F.

Principle—The camera depends on the infrared emitted by all objects at temperatures above absolute zero (− 459.6° F). The heat detector, called a thermistor bolometer, contains thin flakes of oxide semiconductors. When hit by radiation, its electrical resistance changes. Measurements of the changes can be made in 1/1000 second.

Limitations—The device doesn't work too well in fog or heavy clouds, says the maker, Barnes Engineering Co., Stamford, Conn. It does penetrate between 10 and 100 times better than visual light; most smoke is no obstacle.

Objects photographed can be easily recognized.



Operator inserts sheet in first alkaline bath which is kept at 150 to 180° F. Pencil indicates moly after final rinse. Dark piece (bottom) has had first bath; center one shows smut before rinsing

New Method To Clean Moly

Two-step chemical baths are favored by Ryan Aeronautical Co. They remove oxides at low temperatures, preparing surface for fusion welding. Process takes less than 20 minutes

HERE is a practical way to remove oxides from molybdenum. It's a two-step dip process used by Ryan Aeronautical Co., San Diego, Calif.

Bath No. 1: Use water solution of 10 per cent sodium hydroxide, 5 per cent potassium permanganate at 150 to 180° F. Immersion time: 5 to 10 minutes.

Bath No. 2: Use water solution of 15 per cent sulfuric, 15 per cent hydrochloric, and 6 to 10 per cent chromic acid at room temperature. Immersion time: 5 to 10 minutes.

Need—Ryan chemists say the method is particularly good for deoxidizing molybdenum prior to fusion welding. They feel it can also be used whenever molybdenum requires deoxidizing.

Chemically, the first bath increases the valences of oxides. They are easily removed by a pressure spray, but a small amount of black smut remains.

The second bath contains acids that remove the smut. They do not attack the metal.

The range of operation of the first bath is fairly wide, says Ryan. It depends more on the concentration of sodium hydroxide than that of potassium permanganate.

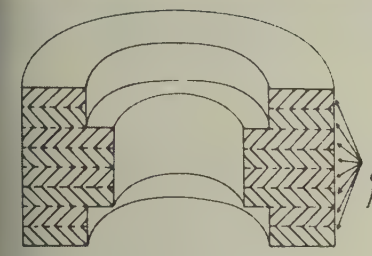
Uses—Molybdenum sheets are used in vacuum tubes, heating elements in electric furnaces, high temperature parts of gas turbines, ramjets, and rockets. The metal has a low thermal neutron cross section. Combined with its ability to withstand temperatures over 1600° F, it may soon qualify for nuclear reactor applications.

Properties—The metal melts at 4730° F, so at room temperature it is much "colder" than steel. Normal fabricating must be done above 400° F.

Its most valuable property is heat resistance. Given surface protection from oxygen, it can be used for structures which contain molten alloys and metals. Some (like lithium, sodium, and sodium-potassium) are used as coolants in nuclear reactors.

VULCANITE REGULATING WHEEL

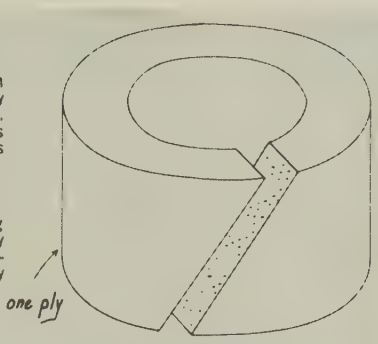
3 Molding Methods make "U.S." Wheels the pace-setters



ORDINARY WHEEL

In ordinary construction (multiple ply), plies vary slightly from each other. Very often this causes variation in hardness across face of wheel.

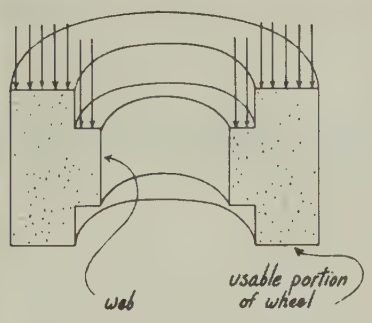
But in U.S. Regulating Wheel, the one-ply "wrap-around" construction assures uniformity across wheel face.



"U. S." WHEEL

Unmatched Uniformity

Full Molding Pressure



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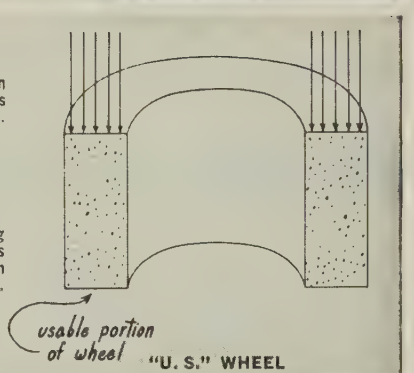
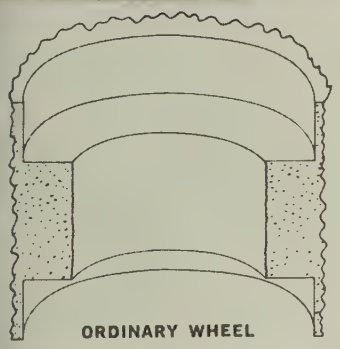
The integral web in ordinary wheel absorbs part of molding force.

In U. S. Regulating Wheel, there is always full molding pressure on usable portion of wheel.



"U. S." WHEEL



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Most methods of arbor hole preparation do not permit a closer clearance than .005".

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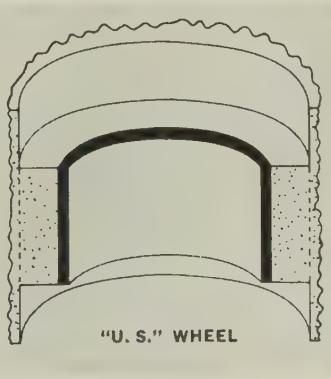

"U. S." WHEEL

Arbor Clearance of .001"

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This article is a condensation of a paper, "Generation and Use of Prepared Atmospheres in the Annealing of Low Carbon Steel Strip." It was presented at an international symposium on the Annealing of Low Carbon Steel, sponsored by Case Institute of Technology and Lee Wilson Engineering Co. Inc. in Cleveland, Oct. 29-30. Excerpts from a number of other papers appeared on Pages 120 and 121 of the Nov. 11 issue of STEEL.

Table 1.

Iron Sponge for Sulfur Removal

Composition of sponge

Fe_2O_3	9 lb per bushel
Wood shavings	14 lb per bushel
Alkali	2 lb per bushel
Water	12.3 lb per bushel
Space requirements	1 cu ft per bushel
Moisture content	30 to 50 per cent
pH	9 to 10 (alkaline)
Temperature of gas	not over 110° F

Prepared Annealing Atmospheres

A good many of the ills of annealing can be blamed on the prepared atmosphere. Here are practical tips on avoiding them in annealing low carbon steel strip

By GEORGE J. CAMPBELL
Assistant Fuel Engineer
Sparrows Point Plant
Bethlehem Steel Co.
Sparrows Point, Md.

DURING the period between the first cold mill and the first electrolytic tinning lines, the prepared atmosphere used for coil or box annealing was a deoxidizing gas with an analysis of roughly 22 to 23 per cent combustibles, 5 to 8 per cent CO_2, and the balance nitrogen. An effort was made to control its water vapor—and its hydrogen sulfide content when coke oven gas was the fuel.

Wide variations in surface appearance of annealed sheets and coils were the rule, but because all of this product was pickled and hot dipped, the weight of coating was the main factor in tin plate quality. Steel surface condition before coating was not a problem.

Closer Control—Today, about 75 per cent of all tin products are electrolytically coated. With the lighter electrolytic coatings, better surface quality of annealed strip became of paramount importance. In turn, more accurate control and application of prepared atmospheres were demanded.

It became necessary to eliminate certain gases to produce an annealed product free of annealing defects. To show why, we will take the components of a rich deoxidizing gas which individually or in combination with other components can cause surface defects on the annealed strip.

Sulfur—Mill coke oven gas contains 400 to 500 grains of hydrogen sulfide per 100 cu ft and 10 to 30 grains of organic sulfur. Sulfur compounds, particularly H_2S, will discolor steel strip during the annealing cycle. The appearance is blue-gray over the outside laps, with some penetration between laps. The severity depends on the amount of sulfur plus length of exposure.

Sulfur discoloration is hard to remove even with severe pickling. In both electrolytic and hot dip tin plate, the coated surface will have a dull finish, sometimes referred to as dull border, or snakes.

Removal—The usual method of removing H_2S is to pass the raw coke oven gas through a solution of sodium carbonate. A well designed system can remove H_2S down to 5 grains per 100 cu ft. Little, if any, organic sulfur is removed.

During combustion, the organic sulfur and the remainder of the H_2S will oxidize to SO_2, but in the presence of H_2 at elevated temperatures and alumina brick as a catalyst, the SO_2 will revert to H_2S. Tests have shown more H_2S after combustion than in the gas before

Table 2. K-Values with Variable Dew Points

No.	Dew Point	Per Cent H_2O	$\frac{CO \times H_2O}{CO_2 \times H_2}$ = K Factor
1	+40.0° F	0.8	$\frac{0.094 \times 0.008}{0.054 \times 0.12}$ = 0.116
2	+45.0° F	0.96	$\frac{0.094 \times 0.0096}{0.054 \times 0.12}$ = 0.14
3	+50.0° F	1.2	$\frac{0.094 \times 0.012}{0.054 \times 0.12}$ = 0.174
4	+55.0° F	1.4	$\frac{0.094 \times 0.014}{0.054 \times 0.12}$ = 0.20
5	+60.0° F	1.7	$\frac{0.094 \times 0.017}{0.054 \times 0.12}$ = 0.25

ANNEALING . . .

combustion. For this reason, the gas is again passed through sulfur purifiers, usually iron sponge towers. (See Table 1.) This is the key to complete elimination of H_2S and the answer to discoloration due to sulfur.

Natural Gas—When this is used as a fuel, sulfur is usually not a problem. However, the gas odorant is usually sulfur mercaptans, so it is best to check amount and kind with the local utility company.

Some utility companies fortify or make up peak demands with manufactured gas. When they do, some organic sulfur will usually be present. It is good practice to again use iron sponge purifying towers after the combustion chamber for final cleanup of the reverted sulfur compounds, which at this point are most likely H_2S.

Carbon Edge—This is just what the name implies: A hard carbonaceous buildup along the edge of the strip. Being high in carbon, it does not react to pickling or cleaning; the affected area will not coat.

Carbon edge can be caused by CH_4 and as little as 0.25 per cent will deposit considerable carbon on the strip edge. The reaction taking place is:

$$CH_4 + Heat = 2H_2 + C$$

A good deoxidizing atmosphere should have less than 0.10 per cent CH_4.

Combustion—Holding the CH_4 content of the deoxidizing atmosphere to less than 0.10 per cent will, to a great extent, establish the CO, CO_2, and H_2 content of the final mixture.

Hydrocarbons combine with oxygen to form alcohols and aldehydes as a preliminary step in burning to CO, CO_2, and H_2O. If sufficient oxygen is not present to reform all the hydrocarbons (in this case CH_4) to aldehydes, some CH_4 will be present in the final mixture. In addition, soot formation will take place, causing stoppages in the combustion or cooling system of the generator. Too much oxygen will produce a lean mixture, low in CO and H_2 and high in CO_2.

Composition—The final composition of the deoxidizing gas is fixed within narrow limits, and variations greater than 0.2 per cent of CO, CO_2, and H_2 should not be tolerated. The practice with a deoxidizing atmosphere is to hold the CO and H_2 contents as high as possible, to have a more highly reducing atmosphere. How high the combustibles can be held depends on the composition of the fuel gas, the temperature of the combustion chamber, and sufficient high alumina brick to act as a catalyst. With either natural or coke oven gas, 21 to 22 per cent combustibles can be attained with 0.1 per cent or less of CH_4 in the final mixture.

A typical analysis of a satisfactory deoxidizing atmosphere made with natural gas would be:

H_2	12.0 per cent
CO	9.4 per cent
CO_2	5.4 per cent
N_2	73.2 per cent
Dew Point	+50.0°F

Etching — Etching produces a roughened appearance on bright steel, which prevents good reflow of the coated tin—producing a mat finish unsatisfactory for most tin products. It is normally accompanied with soot deposit around the affected areas.

Etching and soot deposition are caused by too much CO, compared with water vapor, or too low a water vapor content, compared with CO. The reactions are:

1. The water gas reaction:

(*Please turn to Page* 166)

Table 3. Gases Evolved from Coils

Coil Condition	Rolling Oil	Protective Atmosphere	Evolved Gases (per cent) CO	CO_2	H_2	CH_4
Washed	. .	Nitrogen	0.5–11	0.5–5.5	0.5–13	
Washed	. . .	None	1	0.5	3.5	
Unwashed	A	HN	0–35	1–8	2–18	0.5–10
Unwashed	A	DE–OX	0.5–25	2–8	0.5–24	0.5–9
Unwashed	B	HN	0.5–22	2–5	1–17	0.5–15
Unwashed	B	DE–OX	0.5–15	1–7	3–18	0.5–5

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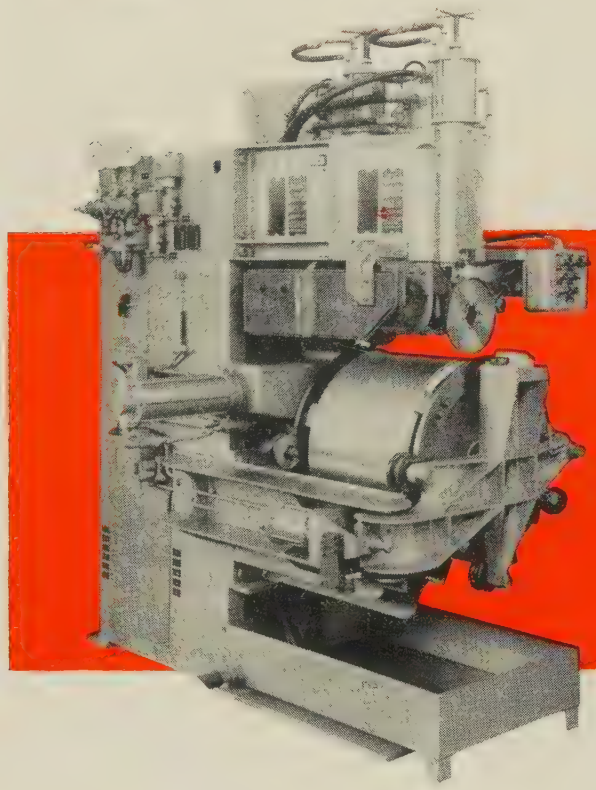

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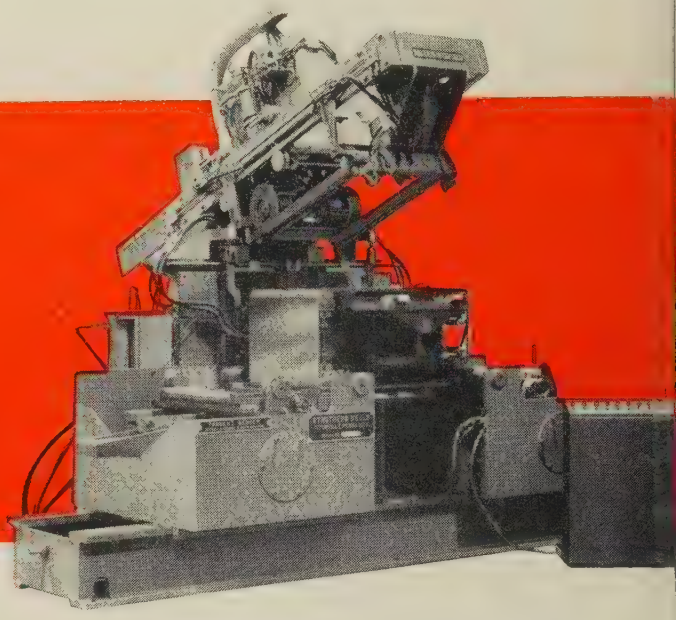

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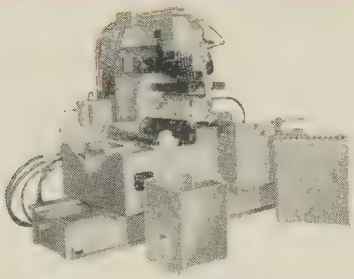

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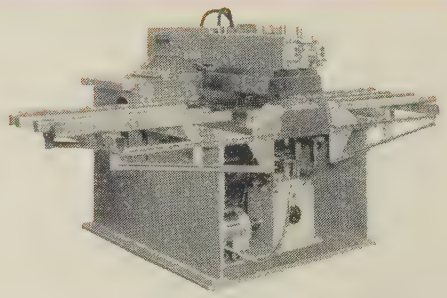

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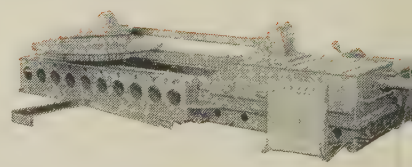

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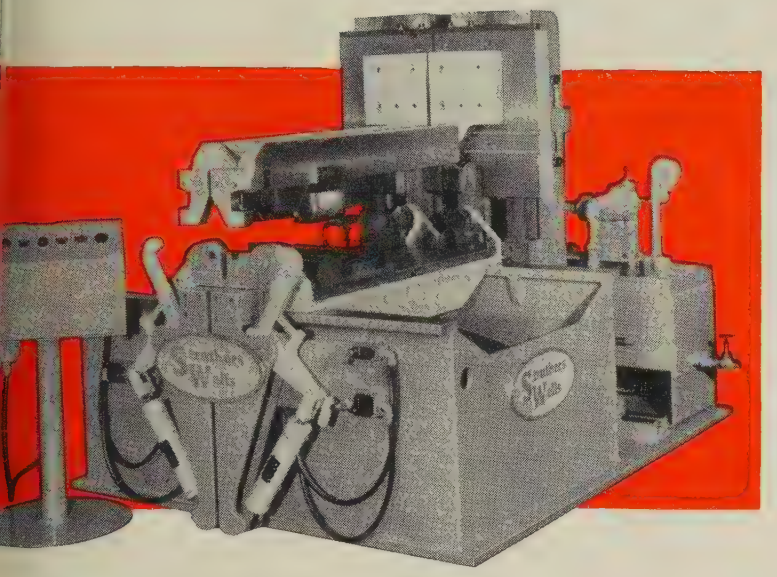
Machinery lines of Struthers Wells

The Taylor-Winfield Corporation, leading electric welder manufacturer, has purchased the exclusive lines of metal-forming and work-handling machinery formerly built by the Struthers-Wells Corporation.



Taylor-Winfield tangent benders, roller table and tumble die benders, punching and notching machines, folding machines, brake presses, destackers, pipe benders and related dies are now offered to automotive, home appliance and other sheet metal product manufacturers. One fully responsible builder now can supply a coordinated production line—handling coil or sheet to the final formed and welded product.

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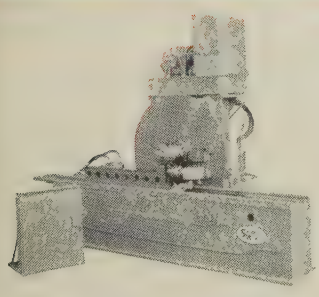

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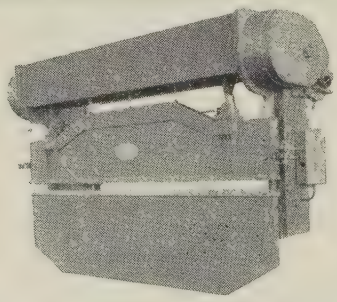

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ANNEALING . . .

$CO + H_2O = CO_2 + H_2$

2. The producer gas reaction:

$2CO + Heat = CO_2 + C$

The water gas reaction is readily reversible, and it is the combination of both reactions which causes etching and carbon.

Discoloration — Brown or blue discoloration is oxidation of the surface of the strip. Free oxygen as in air or in combination with CO_2 or water vapor is the usual cause. It occurs during the cooling cycle, between 1000 and 300° F.

It is most unusual to find free oxygen in partially combusted prepared gas, but as little as 0.10 per cent is sufficient to cause considerable discoloration. It can be pickled off, but heavy pickling will leave a mat finish on lightweight coated tin. In appearance, it's similar to etching. Brown or blue steel is not acceptable for black plate products.

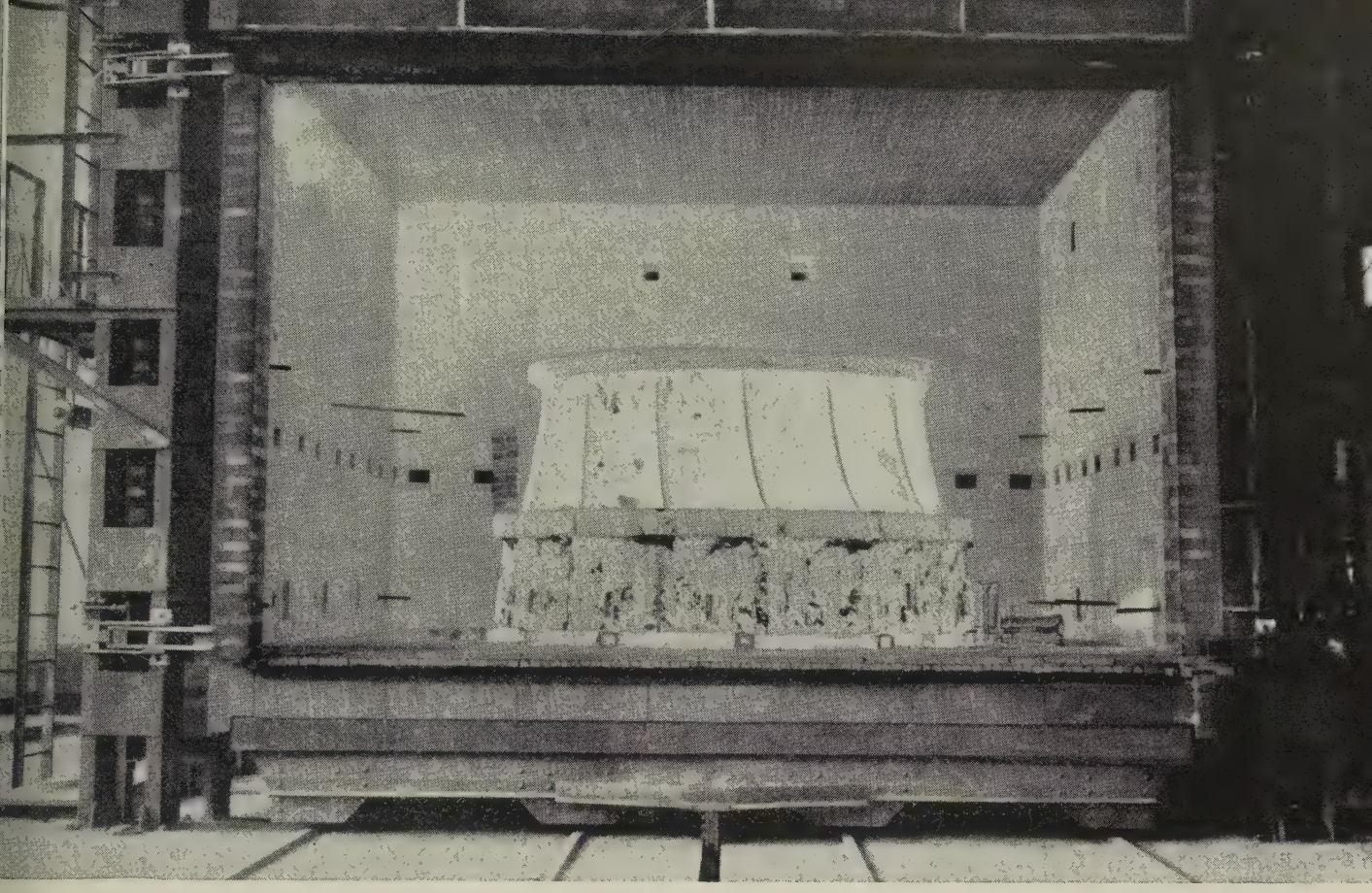
Oxidizing Agents — Theoretical equilibrium curves indicate that equal volumes of CO and CO_2, below 1000° F, will not discolor bright steel strip. Above 1000° F, oxidation will occur, the reaction being: $CO_2 + Fe = CO + FeO$.

A typical gas contains 5.4 per cent CO_2 and 9.4 per cent CO. Referring to the equilibrium curve, we find this gas oxidizing at about 1450° F and above, and progressively reducing below this temperature. CO_2/CO ratios of 1:2 and lower are reducing at all annealing temperatures.

The other oxidizing agent is water vapor with iron, the reaction being: $H_2O + Fe = H_2 + FeO$. In our typical gas with +50.0° F dew point (about 1.2 per cent water vapor) and 12.0 per cent H_2, the H_2O/H_2 ratio is 1:10. Referring to the equilibrium curves, we find this gas is reducing at 700° F or above; below that temperature the gas is oxidizing.

Complex Mixture—In a gas containing CO, CO_2, H_2, and H_2O, such as is produced for prepared atmosphere, the lower ratios of CO_2/CO are strongly reducing and become progressively more so as steel temperatures decrease. H_2O/H_2 ratios are oxidizing between 1:4 ratio at 1225°F and 1:50 ratio at 600° F in practically a straight line relationship.

Because the CO_2/CO reducing ef-



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7 different specialized refractories used in annealing furnace lining

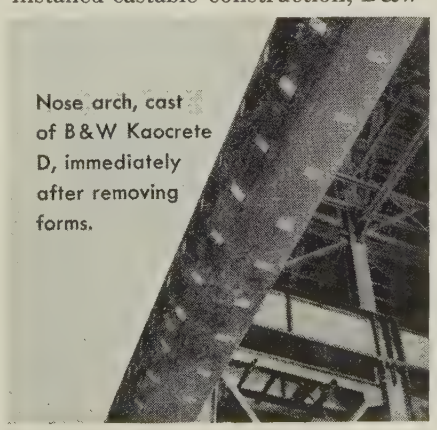
Engineering a furnace lining with *specialized* refractories can save dollars on construction, fuel and maintenance as well as extend productive working time. To achieve these results, seven different B&W refractories were used in the lining of this 25′ x 23′ x 14′ annealing furnace.

Fuel savings and close temperature control were made possible by using three types of *lightweight* B&W Insulating Firebrick. Walls are composed of *B&W K-23 IFB* backed up with *B&W K-16*. Because of the proximity of the burners, the roof was constructed of *B&W K-26 IFB*, a higher temperature brick to guard against the effect of possible localized overheating.

The weight saving construction means about 100 lb less refractory material to heat up per sq ft than with ordinary firebrick, or about 28 tons less in the roof of the furnace. Furthermore, supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special steels.

To eliminate the need for expensive special shapes, the burner tunnels are formed of *B&W's 3000 F refractory castable, Kaocast*. Lintels over the burners and jambs are constructed of rugged *B&W Junior Firebrick*.

To take advantage of fast, easily installed castable construction, *B&W Kaocrete-D* was used in the nose arch (separately pictured). This sturdy castable with a 2500 F use limit was selected to provide strong resistance to abrasion caused by door operation. In addition, the need for costly fired shapes and their supporting castings was eliminated, as was a great deal of expensive engineering detailing.



Nose arch, cast of B&W Kaocrete D, immediately after removing forms.

The car top is insulated with *B&W Kaolite-20*, a 2000 F insulating refractory concrete.

For further information, write for B&W bulletin R-2-H on insulating firebrick and B&W bulletin R-35 on castables.

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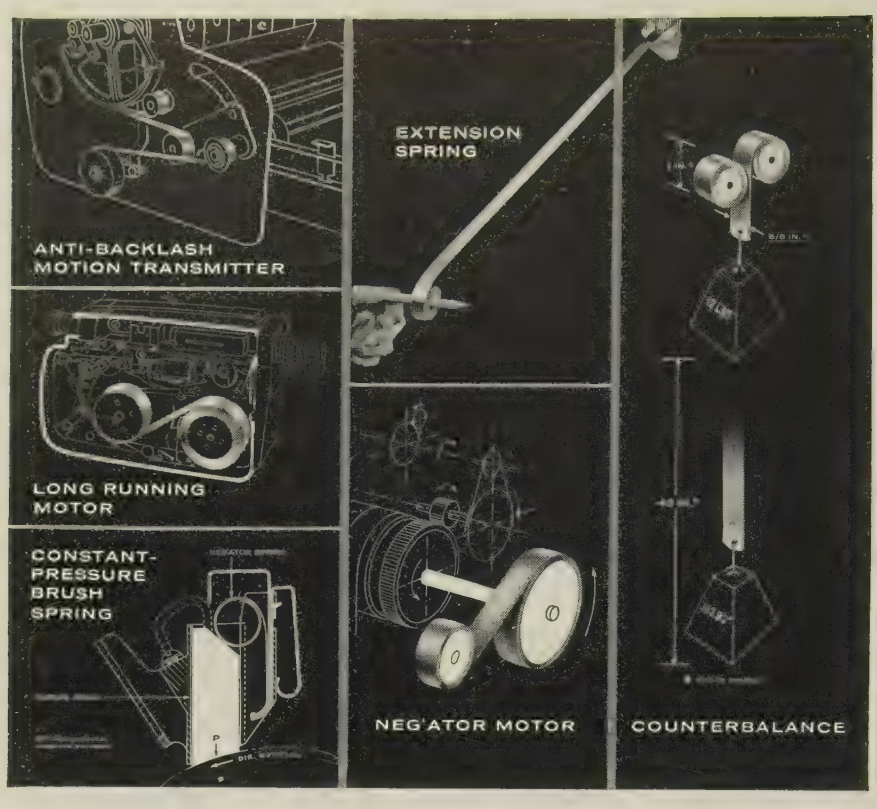

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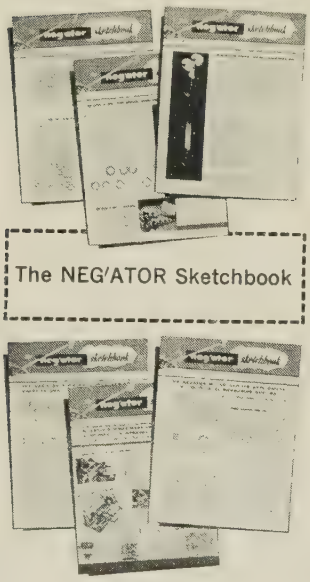

The NEG'ATOR Sketchbook

Things are happening fast to the NEG'ATOR Spring.

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ANNEALING . . .

fect overcomes the H_2O/H_2 oxidizing effect, it is possible to slow-cool large masses of steel down to uncapping temperatures of 250° F without discoloration.

K Factor—When using a gas containing CO, CO_2, H_2, and H_2O, we must consider the equilibrium reaction of the mixture as a whole. The factor

$$\frac{CO \times H_2O}{CO_2 \times H_2}$$

establishes a constant (K factor) to use as a guide for bright annealing steel strip to avoid etching, carbon, or discoloration.

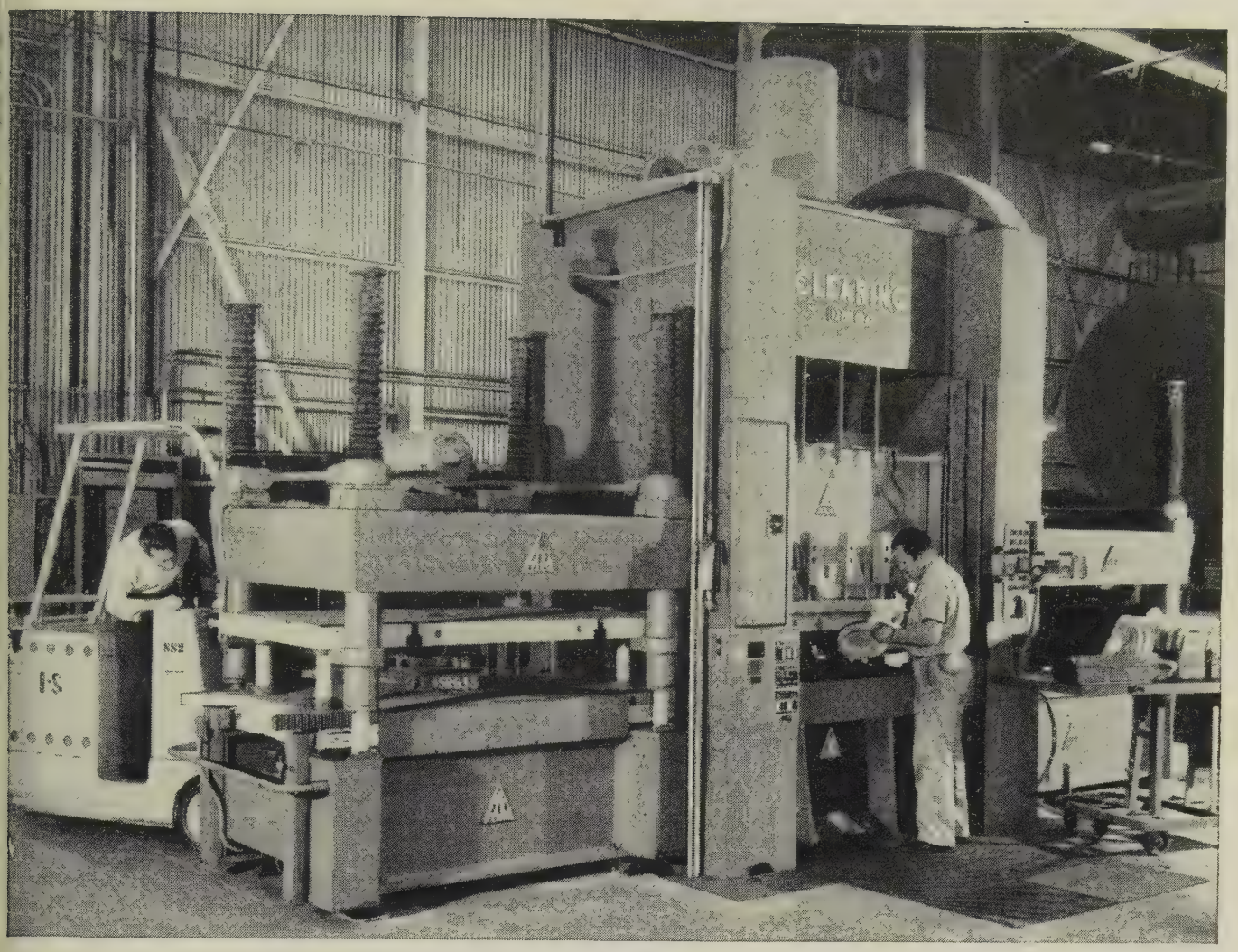
Because the CO, CO_2, and H_2 percentages are fixed by the combustion process, the only component which can be varied is water vapor. Table 2 shows the effect of using a constant gas mixture of 12 per cent H_2, 9.4 CO, and 5.4 CO_2, with different water vapor percentages. We have found that No. 3 in Table 2 will neither etch nor deposit carbon and is the most desirable operating range.

Gases from Steel—In practice, the desirable operating range of K values is much closer than indicated by the table. It is due to the gases driven off the steel during the annealing cycle. Even on washed strip, considerable quantities of CO, CO_2, H_2, and sometimes CH_4, are evolved, and because the water gas reaction is reversible, it is normal for the gases to adjust themselves to furnace conditions.

An atmosphere that could be outside the desirable operating range is created under the inner cover, resulting in some etching and carbon deposition, even though we originally introduced a theoretically correct atmosphere under the covers.

Why Wash?—In a test made to determine what gases were driven from a coil during the annealing cycle (Table 3), the amount of CO derived from unwashed was much higher than from washed coils. Also, methane was produced when coils were not washed—it being a byproduct of the breaking down of the rolling oils.

The type or kind of rolling oils used after the pickler and on the tandem mill, the elapsed time the coils are held between the pickler and tandem mill, and the size of



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While one job is running, the next job is being set up *outside* the press. When you finish this production run, push a button and the dies are unclamped from the press slide. Another push button rolls the new dies into place under the slide. Clamp these in and start running. Now you can set the next job up on the other side of the press.

The device at right is another added feature. It's a die separator that makes it possible to open the dies for maintenance and inspection without tying up crane facilities.

Clearing moving bolster presses can be the answer for your company if you want to put more productive hours in a day. We have a folder prepared on "Push Button Die Setting." It's yours for the asking.

how it works

Dies are set up outside the press. When the current job is completed the bolster is traversed automatically to the right or left. Now the dies are in place for the next job. Slide clamps which hold the die to the slide are also engaged and disengaged automatically.

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ANNEALING . . .

the coils have a pronounced effec on final strip cleanliness or carbo deposit. Because of these var ables, which in most cases are n easy to control, it is practicall impossible to set up an annealin practice for unwashed coils whic will produce a clean carbon-fre strip in all cases.

Time and Temperature—It mus be remembered that time at tem perature is an important factor i gas reactions with iron. Long batch-annealed tin plate heats c 50 or 60 hours may show some su face variations, while short heat of 20 to 30 hours under the sam atmospheric conditions will be sa isfactory. On long (100 hours) un washed sheet coil heats, it is par ticularly difficult to anneal a per fectly bright, free-of-carbon hea with deoxidizing gas.

Remedies — Furnaces designe with high heat input plus convec tor plates and high capacity fan for internal circulation of th gases will contribute to a bette annealed product. They reduc the length of the heats and ex posure time of the steel at tem perature to the prepared atmos phere.

By substituting an HN atmos phere (4.0 per cent H_2, 96.0 N_2) for DE-OX in the anneal, consid erable improvement in strip ap pearance is possible. Light gage and mill clean material have muc less tendency toward carbon edg and somewhat less wipe residue Intermediate and heavy gage hardly ever show carbon edge wit HN, and show some slight im provement on wipe residue.

More Faults—Washed coils ar seldom bothered with annealing defects, provided the protective at mosphere is in balance and is be ing supplied to the pedestal i reasonable amounts. In general annealing defects are found in ran dom coils throughout the furnace room, or quite often on one or two bases. This points out: 1. The particular furnace or bases are not operating properly. 2. The inner covers are leaking, or not proper ly seated in the sand.

Occasionally, there are epidem ics of carbon edge; the carbon is either heavy and black, tenacious ly clinging to the surface of the steel, or white and snakelike, an

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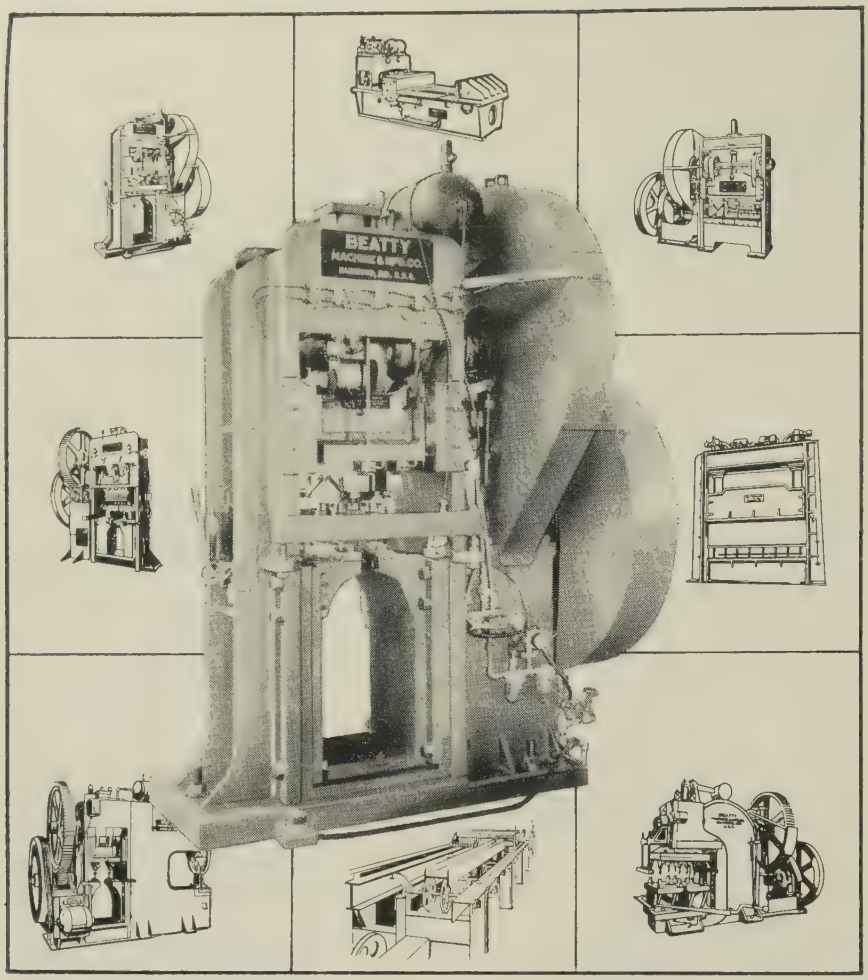

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ANNEALING . . .

actual carbide formation in thi surface of the steel. Most ofte such conditions are caused by: 1 Poor washing practice due pos sibly to worn or cut brushe or speed through the washers. 2 Coils standing too long betwee cold reducing and washing, so tha the oil on the edges hardens an is not all removed by washing.

Not To Blame—High pickle lag the dewet condition of the coate strip, and edge-center-edge varia tions as evidenced by corrosion re sistance tests cannot be attributed entirely to the prepared atmos phere; in fact, there is consider able evidence which shows tha prepared atmosphere has little in fluence on such defects.

Numerous tests show no signif icant difference of steel surface depending on when the gas is turned on. Heats purged with at mosphere 2 hours before firing, on heats without any atmosphere until well into the soak perio show no degree of variation. This applies to washed coils only.

Standard practice is to turn on the prepared atmosphere, whether rich in CO and H_2 or others, a about 700° F steel temperature o 1200° F furnace temperature. Some producers turn on the prepared at mosphere at the beginning of the soak.

Interaction — There is evidence that penetration of the gas be tween laps does contribute to sur face quality variations. Most border conditions fall within this category because there must be some intermingling of the pre pared gas with that driven off the coil, and it is likely that these combined gases are out of equilib rium, thus reforming and acting on the steel. Annealing borders are caused by reactions between the protective atmosphere and the gases being driven out of the coils.

Another indication that there must be considerable penetration of gases between laps is test re sults on pickle lag. Coils annealed in dry hydrogen gas have a low and consistent pickle lag. Coils annealed in wet hydrogen gas have high pickle lag values—they will vary considerably over wide limits, even on the same coil.

Decarb—There is some question as to whether low carbon steel strip

ANNEALING . . .

an be carburized or decarburized uring the annealing process. Certainly all the carburizing gases (CO and CH_4) and all the decarburizing gases (CO_2, H_2O, and possibly O_2) are present, along with favorable time at temperature conditions.

We know that carbon enters into the equilibrium factors of gas-iron reactions. It is possible that gas-iron-carbon reactions could be responsible for some of the surface quality variations sometimes encountered but not easily explained.

Need for Change — By far the largest percentage of coiled strip is still annealed in deoxidizing atmosphere. In spite of the potential hazard of using it, only surprisingly small amounts of steel are rejected for annealing defects —probably 0.25 per cent or less.

However, the desire of the steel producers for a superior product, and the demand of the trade for better and better quality have prompted the need for an annealing atmosphere that will eliminate or at least alleviate the effect of prepared gases on steel surface finishes. The best would be a dry H_2N_2 mixture.

HN Improvement — Hydrogen-nitrogen atmosphere produces a bright plate, consistently low in pickle lag and reasonably satisfactory in edge-center-edge corrosion resistance. Occasionally, dewet or white edge will appear, and this is most likely caused by gas evolution from the coils and not the prepared gas. HN produces a satisfactory sheet mill product; hydrogen-nitrogen made from fuel gas should do equally as well.

Because of the long time at temperature, even small quantities (in the nature of 0.25 per cent) of CO, CO_2, and high dew point will cause the same surface defects with H_2N_2 as with deoxidizing gas, but not to the same degree of severity.

H_2N_2 from fuel gas has two drawbacks which have probably retarded its use. One is the high capital investment for the generators; the second is the high operating cost.

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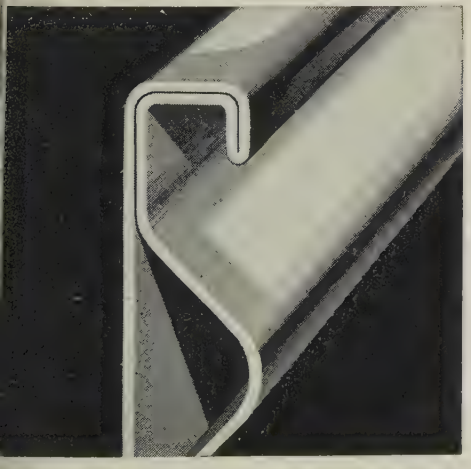

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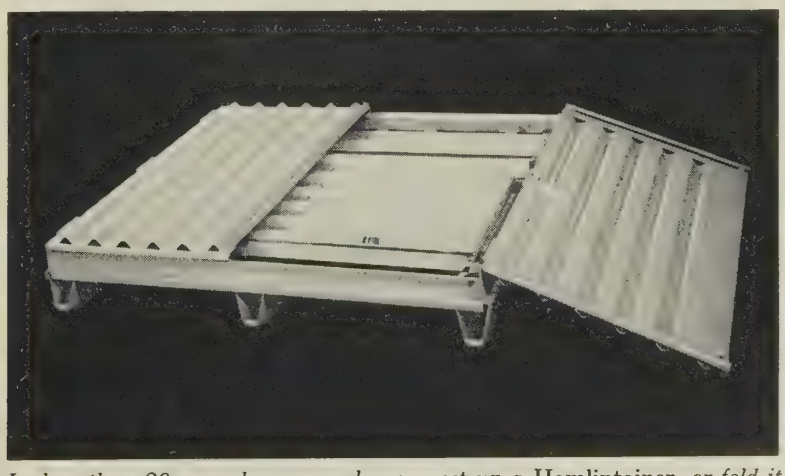

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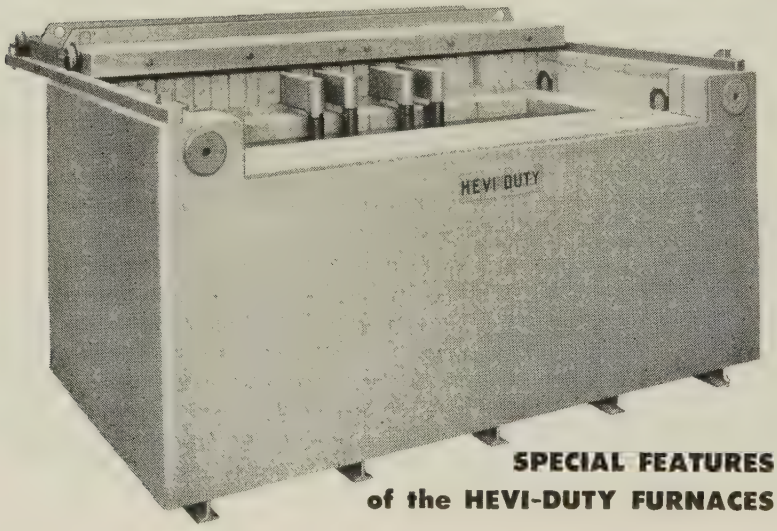

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IN building the P6M SeaMaster, the Navy's first multijet seaplane, the Martin Co., Baltimore, came up with a new method to drill and countersink thousands of rivet holes in the skins.

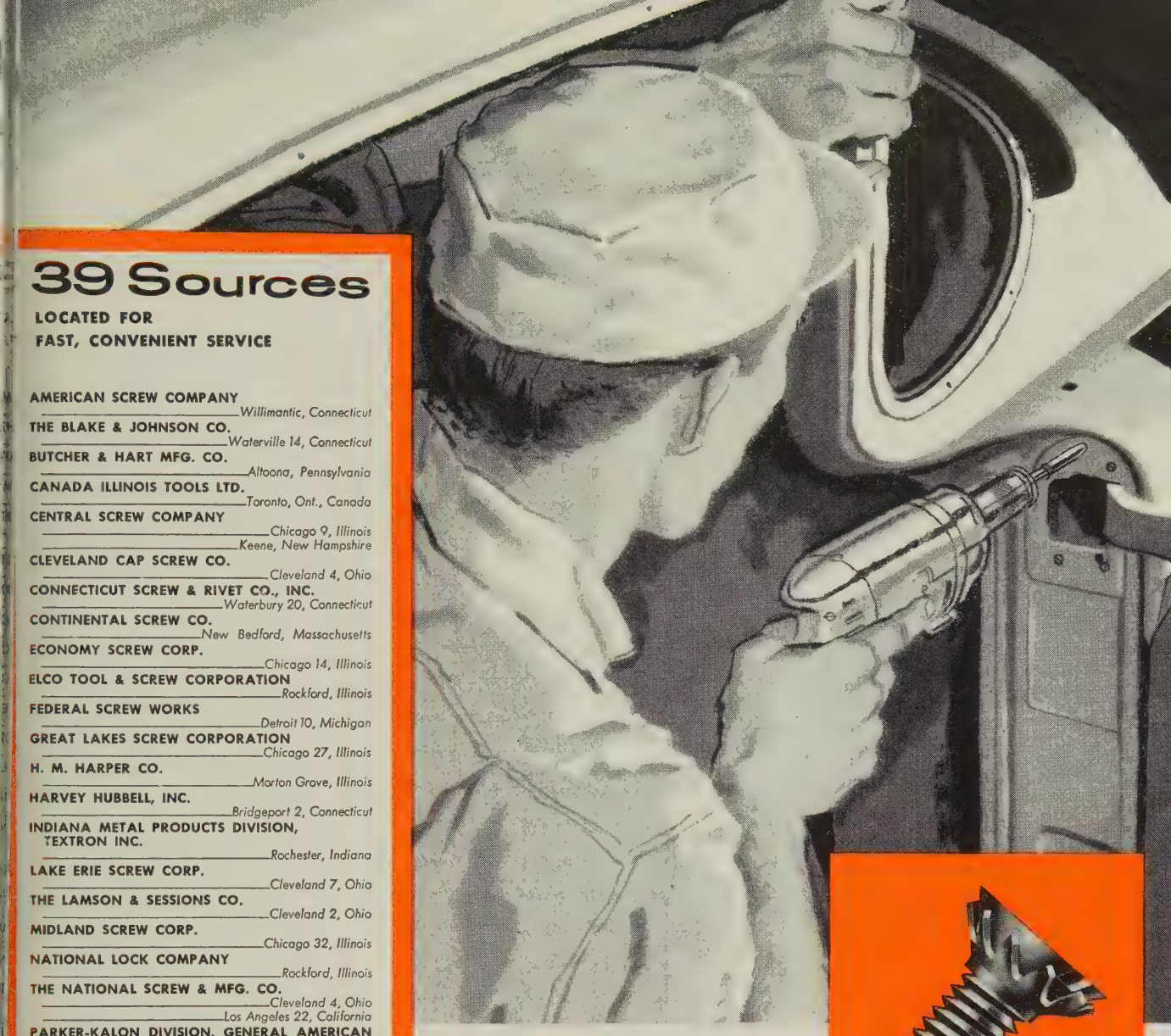
The way the job used to be done: A laminated plastic fixture with properly spaced locating holes was built and temporarily attached to the skin. It was costly, unwieldy and difficult to set up for normal 90-degree holes, and it required special storage and handling facilities.

New Way—To do the job more accurately and economically, Martin developed a vacuum assembly which holds an Airfeedrill in position.

The assembly has three parts – a vacuum plate, the slide assembly for holding the drill, and a clamp at each end of the slide assembly. A Martin-developed venturi fitting draws the vacuum which holds the vacuum plate to the panel. The fitting operates off the compressed air system.

90-Degree—Each end of the vacuum plate attaches to an adjustable clamp. The two clamps hold the slide assembly in place against the panel just above the vacuum plate. Pressure on the assembly is increased by tightening the clamps. Four feet on the slide as-

Operator locks drill into position in vacuum assembly



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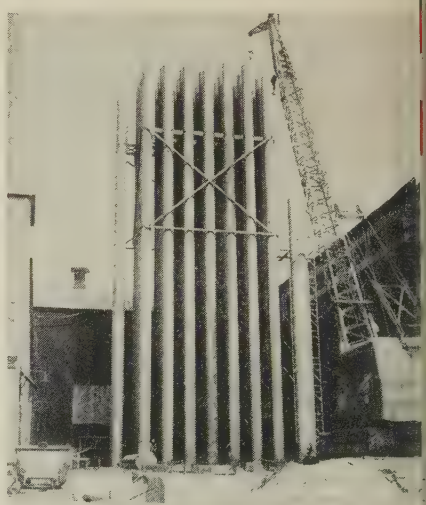
The drill is preadjusted, so tha it drills the hole and then counte sinks it to the proper depth. Aft the hole is drilled, the lever raised, and the drill is moved alon until the lever reaches the ne notch.

With the vacuum drilling ji Martin has cut time and tooli costs 85 per cent. The improve accuracy of the setup also leads t fewer rejected fasteners.



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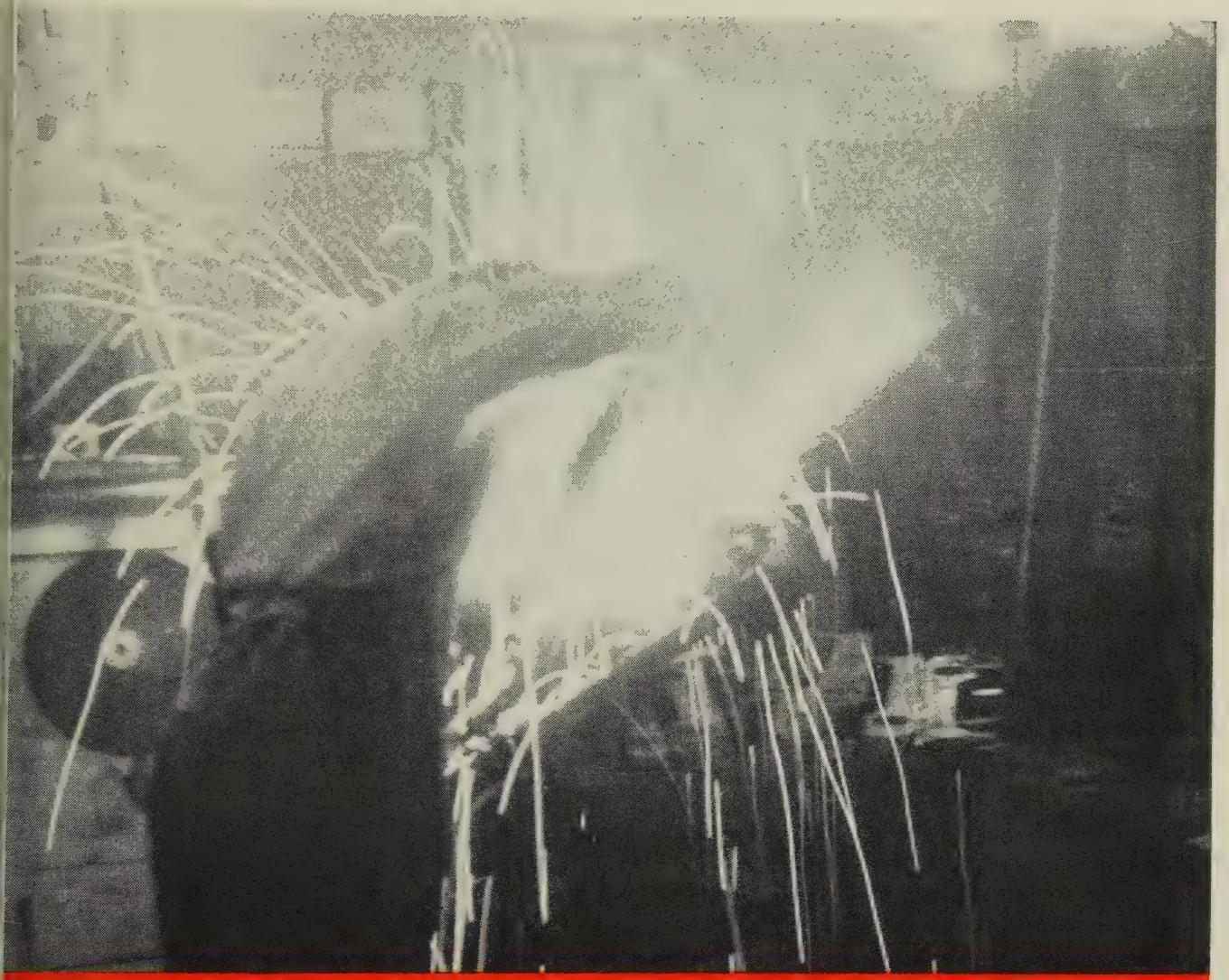

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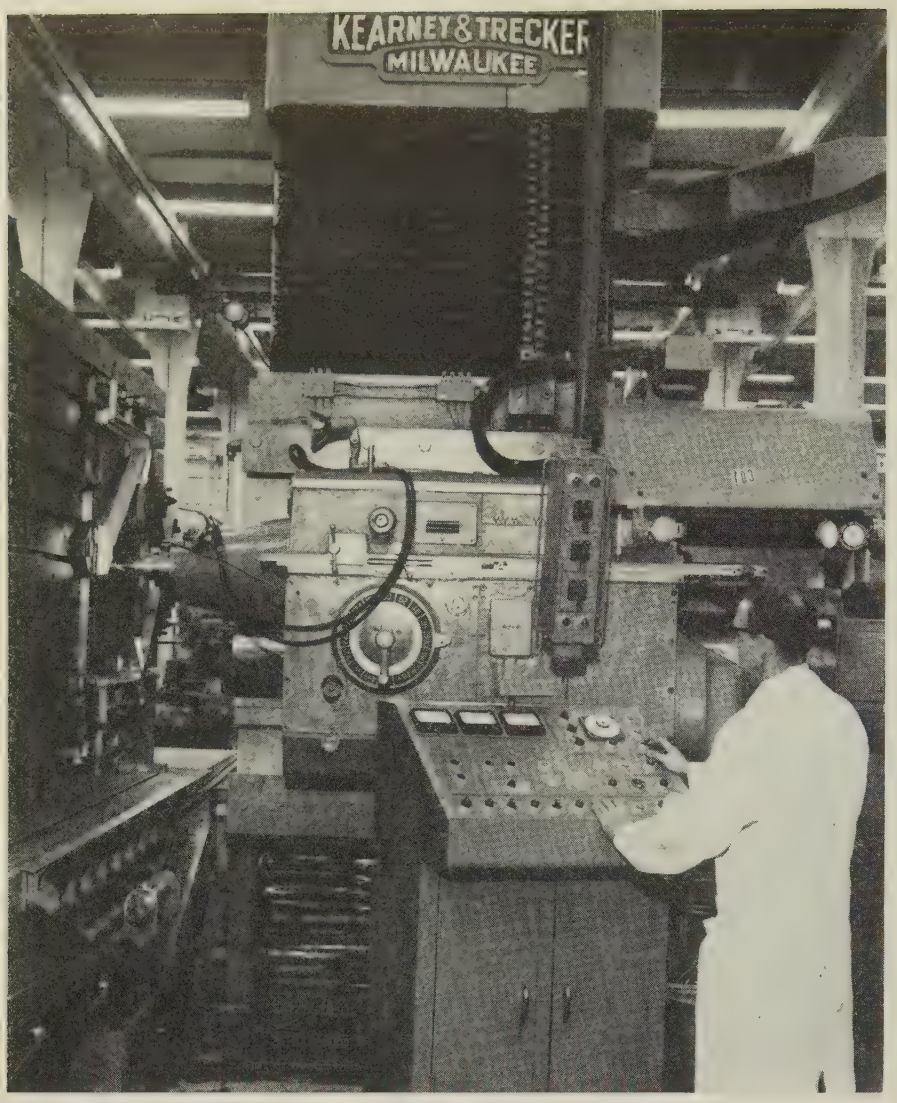


The milling machine bites into an aircraft part as a Bendix-built tape control guides the cycle

Making Tape Control Work

By LEON E. LAUX
Chief, Mfg. Research & Development
Martin Co.
Baltimore

Here are some of the problems engineers at Martin solved while getting their new machine into production. Early training of personnel has paid off

WE GOT our three dimension, punched tape controlled, profile milling machine at the Baltimore Div. in June. Three weeks later, we made our first trial cut.

Since then, we have had the growing pains that are inherent in a new concept. With each one, we have learned more about the limitations and potentials of this system.

Here are half a dozen lessons we've learned:

Precision—The slightest lack of rigidity in the tools can greatly reduce the accuracy you get from a control tape. Our first tests showed we weren't getting the 0.001 to 0.002 in. tolerances we had expected. We ran positioning tests in which a free-running spindle was programmed to cross a 4 by 10 ft work surface diagonally and return to the starting point. In all ten tests, the spindle returned to its starting point within 0.001 in.

It showed conclusively that the control unit had a high degree of repeatability and that the runout was caused by deflection of the cutter. With a cutter and holding fixture of sufficient rigidity, it's reasonable to expect that we can get the tolerances we expected.

Maintenance—We haven't had it long enough to give a comprehensive report on its reliability, but we expect the machine to run maintenance-free 85 to 90 per cent of its planned operating time. It may sound like a lot of downtime, but remember, we are handling a piece of equipment that is far more complex than anything we have had in a machine shop before. As we become acquainted with it, we may be able to reduce the figure.

In addition, we spend 30 to 60 minutes a day on preventive maintenance, just before the machine goes into operation. We run test tapes that bring all phases of the machine control unit into operation. Marginal checks are also run to determine if any electronic components have failed, or are about to.

Alignment—A short time after our machine was installed, we ran a part which inspection refused to accept. We spent hours checking the tape before we realized that the machine was out of alignment.

It is a condition that can't be compensated for by the machine operator, as is possible on a conventional machine. Even if the

This article is based on information Mr. Laux presented at the Los Angeles Contour Machining Conference, sponsored by True-Trace Corp.

TAPE CONTROL . . .

tape is perfect, the machine will produce parts that deviate from nominal dimensions in direct proportion to the amount of machine misalignment.

We now check alignment once a month and will continue to do so until the machine's foundation stops settling.

Idle Time—The first part we machined in limited production was a large bulkhead fitting for the P6M SeaMaster. We found we were spending 50 per cent of our time changing and adding clamps to the holding fixture while the machine stood idle.

We can reduce such lost time. We must consider the heavier cuts and faster feeds possible with numerical control and position the clamps where they provide the greatest rigidity and least amount of cutter interference.

Tape Setup—As you would expect, we made many errors in the first tape. To avoid making a new tape each time we discovered an error, we decided to break the job into operations, putting about 4 ft of blank leader between them on the tapes.

When we come to an operation that's incorrect, we cut it out and splice in a corrected one. At the end of each operation, the spindle returns to a reference point.

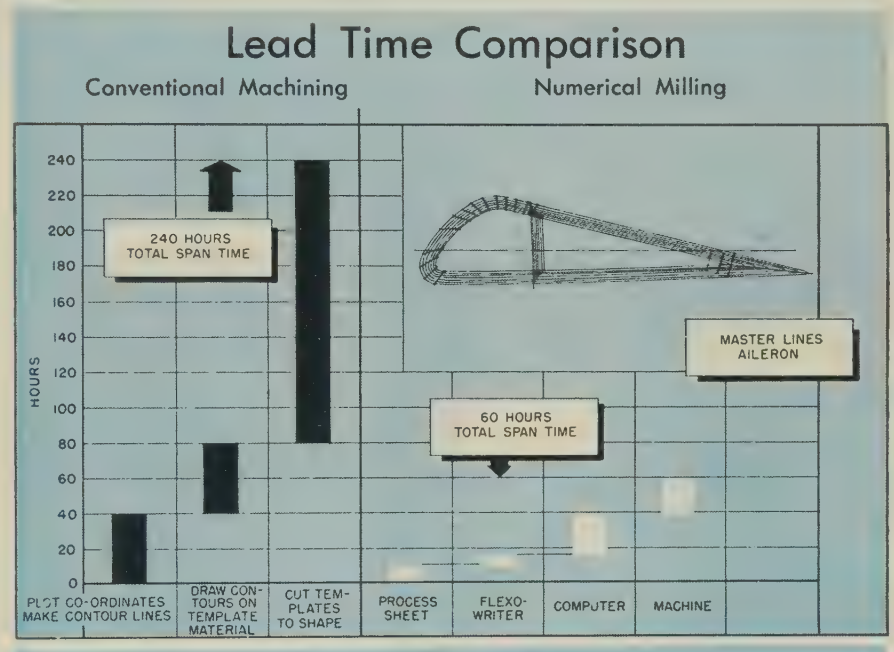
The system has a disadvantage: As the spindle returns to the reference point, it cuts air. But we will continue to use it until we are thoroughly experienced in tape-making.

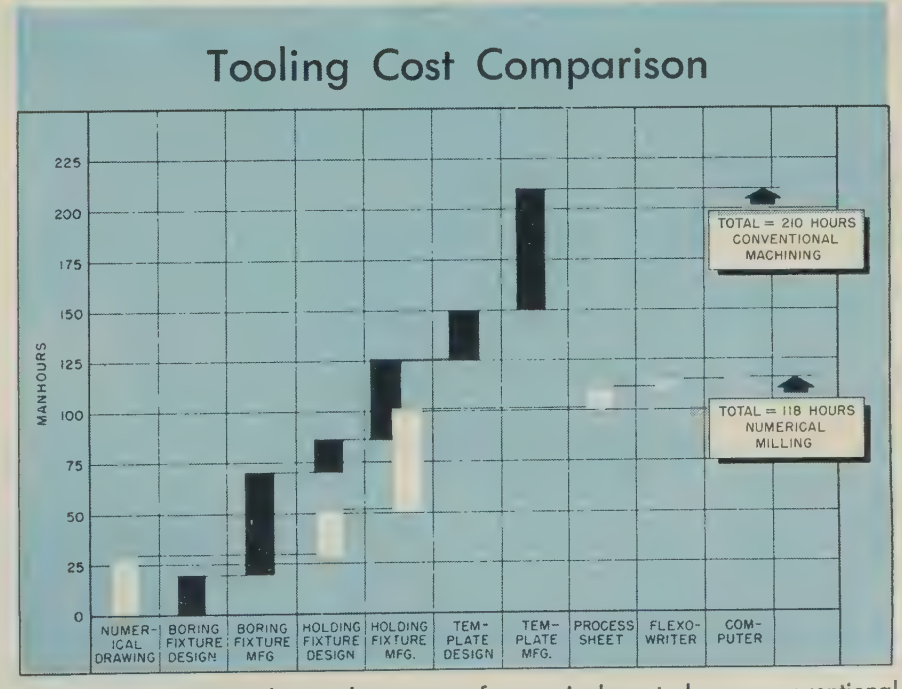
Power—During initial tests, we noted the machine had an abundance of reserve power. As we replaced bad operations in the tape, we increased speeds and feeds for roughing cuts where a heavier cutter could be used and accuracy was secondary. By the time we made the last correction, we were using speeds and feeds 100 per cent greater than originally planned.

Despite mistakes on the first tape, the results were gratifying. We reduced rough machining time to a quarter of that formerly required by conventional methods.

Head Start—A year before our machine was delivered, we started an indoctrination program for all personnel who would be connected with the numerical control system,

A quality control man checks the part. He accepts or rejects the tape, depending on part conformity to specifications





These case histories show advantages of numerical control over conventional machining in terms of tooling cost and required leadtime

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TAPE CONTROL . . .

including those processing materials and those involved in its operation.

The program entailed: Defining what was to be done in every step of the processing procedure, selecting qualified personnel, and providing specialized training in computer technology and operation.

With a majority of our machine tools still under manual and template control, we had to plan for both types of production. Conventional engineering drawings and processing methods could not be completely abolished in favor of numerical control. But the system of dimensioning engineering drawings was altered to permit a more rapid translation of dimensions into numerical control data.

Tape Preparation — Once the basic numerical plan is established for a part, transforming the plan into a machine control tape is fairly routine.

The steps: 1. A write-up describing all conventional numerically controlled machining operations and instructions. 2. A numerical control drawing, which is a pictorial representation of the part, showing the path of the cutter and the sequence of cuts. 3. A process sheet, containing machining data in numerical control code. 4. Paper process tape—Flexowriter typing of the data appearing on the numerical control process sheet. 5. Retyping the original process tape for verification. 6. Feeding of the process tape data through the computer and punching of the machine control tape.

All tape preparation is done in an air conditioned, humidity controlled room. Only the machine control tape, the write-up, and part drawing are sent to the shop. All other data are filed for future use.

We know the job has only begun. The indoctrination of all people concerned must be broadened. The potential can be realized only if we train men to think in terms of numerical control. Their thinking must be bold and imaginative.

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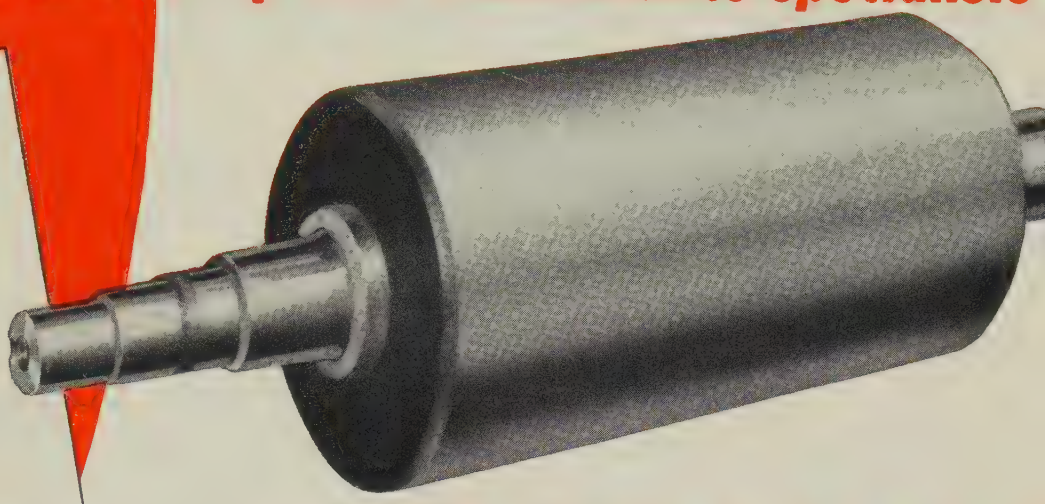

PARALLOY

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CLEANING LINE PINCH ROLLS • SINKER ROLLS
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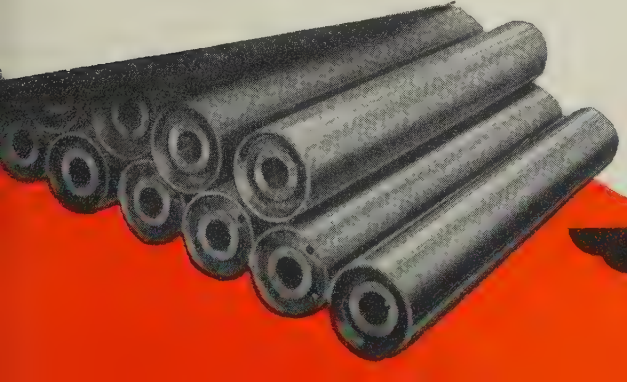
Q. How can heat check, warpage and cracking be overcome?

A. Let Youngstown's proven experience with Ductile Cast Iron help you in the applications at right.



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Ductile Cast Iron Rolls are reducing maintenance in hot strip mills . . . especially good under the sprays. We invite your inquiries on rolls or any other ductile iron castings up to 50,000 pounds.

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Jet Blades Cut from Solid

Contour milling machine cuts airfoil shapes from bar stock. Feed and holding systems can be adapted so it works like a magazine-fed chucking machine

HOW DOES a small company compete in the big-time aircraft and missile business? John Breisch, president, Lake Shore Industries Inc., Cleveland, asked himself that question a few years ago. His answer may seem indirect, but it's beginning to pay off.

Rather than set out to trim costs, boost efficiency, or raise output of his production line, he invented a new machine tool. The three-dimensional contour milling machine handles parts much like a two-spindle automatic screw machine does. It cuts turbine blades and buckets from the solid.

How It Works—Raw material comes to the machine as bar stock. (The company has worked with most of the stainless alloys, Inconel, and titanium.) Bars are fed through two spindle drums into the work area of the machine.

Two milling heads oppose the spindle drums and are parallel to them. Rotation of the drums is tied in with the rotation of a master blade or bucket that's six times part size.

As the master turns, a tracer follows it. The tracer controls the distance of the milling heads from the bar stock. As the tracer moves in and out over the contour of the master, the milling heads duplicate the contour on the bar stock (through a mechanical linkage).

Rigidity—Support of the airfoil could be a major problem. To get around this one, all machining on the Contourmatic, is done within 0.030 in. of the drum holding fixture. The bar stock is slowly fed through the drums so that a new, unmachined surface is continually presented to the milling cutters. The finished contour is generated to within 0.0025 in. total indicator reading. All that's required is a final polishing operation.

When it's more practical to work with individual blanks, forgings for example, the drums can be adapted to hold them, and the machine becomes a magazine-fed chucking machine.

How's It Doing?—The first machine has been at work in Lake Shore's Batesburg, S. C., plant for nearly two months. In that time, Mr. Breisch says, scrap parts production has been incomparably low. Production rates vary from 4 to 12 parts an hour, depending on the workpiece material and the part size. Costs, he feels, are as much as 20 per cent under those of more conventionally produced parts.

The machine handles parts up to 2 ft long with a 4 in. chord. Milling cutters, either HSS or carbide have been used, and they can be up to 6 in. diameter.

Backlog — Conceived by Mr. Breisch, the machines were designed and built at Pattern Products Mfg. Co., Detroit. Lake Shore now has two at Batesburg, with eight more on order. Taking the cost-saving story to enginemakers, Mr. Breisch now feels ten machines won't be enough.

Blower Skims Steam

Republic Steel will soon install a topping turbine for more efficient blast furnace blowing

A TOPPING turbine for blast furnace blowing will soon be installed at Republic Steel Corp.'s Cleveland (West Side) furnace plant. It will operate at steam pressures up to 850 psig at 850° F. This is the highest yet for a blowing engine, say engineers of Ingersoll-Rand Co., New York, the builder.

The turbine is rated at 10,400 hp and will drive a 90,000 cfm (at 13 lb) blower, replacing three reciprocating blowing engines.

Separates Steam — A topping turbine skims off high pressure steam (in this case 850 psig, 850° F) and exhausts lower pressure steam for other uses. In the Republic installation, the exhaust steam (at 235 psig and 600° F) will power conventional, low pressure, condensing turbines.

These, along with the topping turbine, will turn centrifugal blowers for split-wind blowing on three furnaces. (In split-wind blowing, several furnaces share the output of a battery of blowers, with variations in wind to individual furnaces accomplished by valving.)

The combination of a topping turbine and split-wind blowing is a relatively new idea in blast furnace operation. This will be the second such installation.

Cuts Water Use—A topping turbine and split-wind blowing is tities of cooling water to condense exhaust steam. Further economies are realized by operating it at base load. Teaming it with condensing turbines is a convenient way to accomplish this.

Changes in the total blowing rate can be handled with the condensing turbines, and steam not needed to drive them can be diverted to the plant utility steam system.

The topping turbine is only one part of a larger plan for revamping Republic's steam system. Another major change is the installation of a new high pressure boiler in the powerhouse to furnish steam for the turbine.

To test new cutting media and tools to their limits, General Electric's Metallurgical Products Department (manufacturers of Carboloy cemented carbides) required a faster, more powerful lathe than any available. This high speed LeBlond 20″ lathe was developed for this purpose. It will rev up to 5,000 r.p.m., make efficient use of its 150 h.p. and permit a 50% overload for short periods.

LeBlond lathes are noted for their inherent stamina and rigidity. In this case it was only necessary to make modifications in the headstock, tailstock spindle and controls—the rest of LeBlond's Heavy Duty 20″ was already powerful enough to take the new high loads.

Just what will this lathe do? The following test data tell the story:

tests tools for tomorrow

WORKPIECE—SAE 1045, 180 Brinell, 48″ long.
TOOL—CEMENTED OXIDE 0 - 30.

TEST DATA

Test **1**
Workpiece diameter, 7.65″. 5000 rpm 10,000 sfm .010 feed. Carriage travel, 50″ per minute over entire workpiece .110 depth of cut. 138 hp consumed

Test **2**
Workpiece diameter, 6.65″. 4300 rpm 7500 sfm .010 feed. Carriage travel, 43″ per minute over entire workpiece .110 depth of cut. 105 hp consumed

Test **3**
Workpiece diameter, 6″. 5000 rpm 7800 sfm .015 feed. Carriage travel, 75″ per minute .100 depth of cut. 148 hp consumed

* 113.6 miles per hour!

Perhaps you've been looking for a lathe with this kind of power and speed. Maybe you have another special turning problem with which LeBlond could help. Or you simply need a good dependable engine lathe. In any case, you can call on LeBlond with confidence. See your nearby LeBlond Distributor or write—

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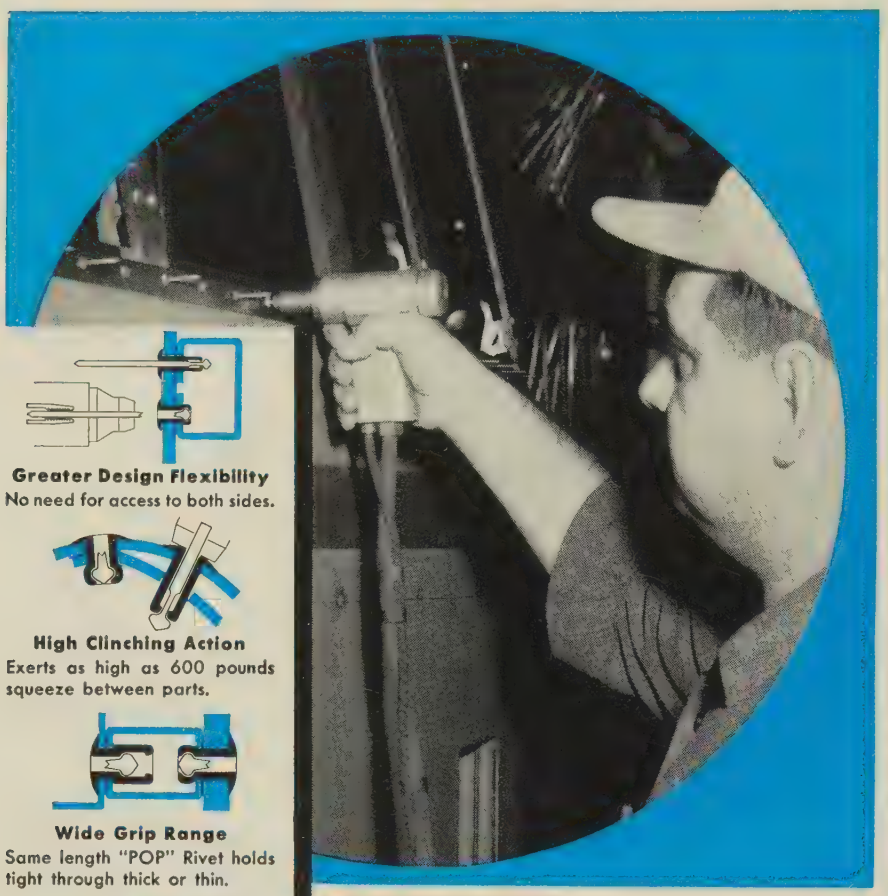

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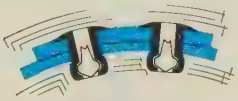

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"POP" Rivets cannot back out or become loose. No lock washers or nuts required.

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Where space is important, "POP" Rivets' minimum head height is the answer.

Less Critical Hole Diameter
Designer wants holes tight, production wants holes larger. "POP" Rivets make both happy.

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Strong, high grip "POP" Rivets need only enough back-up space to provide room for set head.

When buying fasteners, do you figure the *installed costs?* A fastener considered alone may cost very little but be very expensive by the time it's installed and becomes part of a finished product.

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Mag Moves Ahead

Advances in casting, extrusion, welding, brazing, pressing were highlighted at convention

HERE's a progress report gleaned from papers presented at the New York convention of the Magnesium Association.

- Precision castings are being made without a draft angle. Tolerances are within 1/64 in. Metal thickness can be less than 0.100 in.
- Extrusions are larger. Dow Chemical Co.'s 13,200-ton press operates at lower than conventional temperatures. Physical properties are improved.
- Pressing (a process similar to forging) makes parts with no draft.
- Dow's new metering system makes cold chamber casting the equal of the hot chamber method and avoids some of its limitations.
- The future of welding and dip brazing is considerably brighter.

Other Factors — Magnesium's lightness is its greatest asset, says Convair Div., General Dynamics Corp., San Diego, Calif. By comparison, aluminum parts which do the same job weigh 1.5 times more, titanium parts 2.5 times, steel parts 4.5 times.

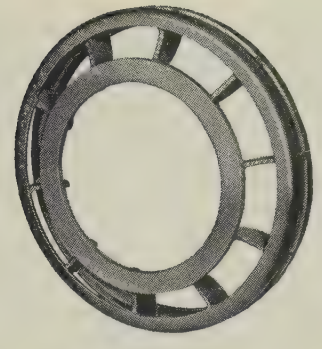
Magnesium's good damping factor and heat conductivity make it a natural for some applications. Booster fins for missiles and mounting boards for electronic equipment are examples.

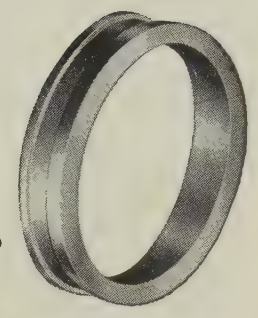
Castings—You are going to find increasingly larger ones in guided missiles and piloted aircraft, says L. H. McCreery, engineering structures materials department, Chance Vought Aircraft Inc., Dallas.

He cites the outer wing panel of a guided missile as an outstanding example of savings. Replacing an assembly, the casting saves $3500 per missile.

Casting the speed brake saves $1000 per piloted plane.

Precision—Chance Vought gives R. H. Osbrink Co., Los Angeles, much of the credit for developing thin walls and increasing the precision of castings. Changes go beyond the foundry: Pattern-





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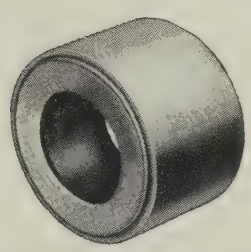

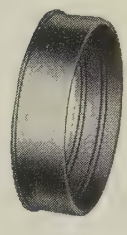

When you specify bulky cast or forged parts, you pay for excess metal...then pay to shave it away! But every ounce of material on "close-tolerance" Cleve-Weld circular steel parts has a function. A minimum of finish machining gives you a component ready for the assembly line!

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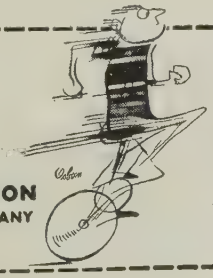

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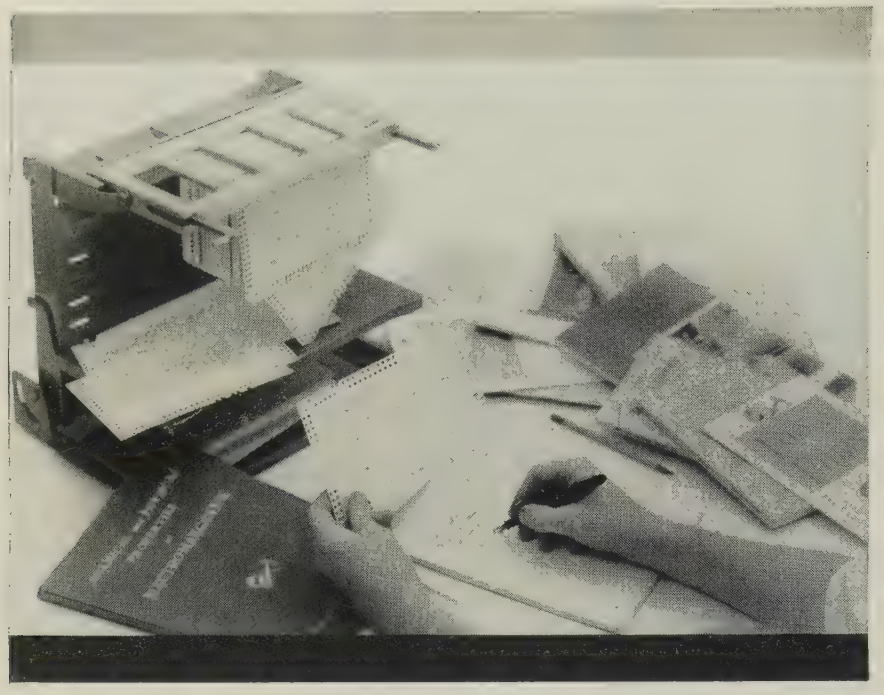

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MAG MOVES AHEAD . . .

makers have upgraded their product; metal control and analysis have been more precise; the composition of molding material has been altered; atmosphere displacement has become necessary.

Testing engineers found unexpected improvements in mechanical properties: They went up as section thickness decreased—probably because of smaller grain size.

One of the biggest castings measures 90 x 48 x 12 in. Thickness varies 3/16 to 2 in.

What's Ahead?—John H. Rizley, chief materials and process engineer, and Robert E. Mihalco, metallurgist, Convair, feel that new casting alloys are needed which can compete with other metals in the 300 to 700° F range.

They also recommend improved foundry standards. Castings must be able to pass exacting nondestructive tests. Cost reductions can be made if foundrymen will improve plaster mold and investment casting techniques.

They also look for increased use of alloys containing thorium, rare earths, and zirconium.

Convair also gives extrusions an important place in tomorrow's airplane design. Mr. Rizley and Mr. Mihalco suggest extrusions:

1. When the shape can't be made by rolling.
2. When it's not economical to machine the shape out of a casting.
3. To combine several small parts into one piece.
4. To replace individual forgings.
5. To cut down machining scrap.

Extrusions — Dow expects big things from its 13,200-ton press: Look for wider sections (maximum 40 in.) and better physical characteristics.

The press makes top grade extrusions which are 50 to 100 per cent larger than those produced by a 5500-ton machine.

Simpler Design—It requires the combination of several small extrusions into one big section, says Dow. High alloy magnesium is more easily broken down by extrusion than by rolling or freehand forging.

It's also more economical to make large forgings from extruded

(*Please turn to Page* 198)

17th Century Fob Watch, courtesy Metropolitan Museum of Art, New York
Exploded Watch Movement, 1645-70, courtesy Mathews & Co., Ltd., London

MAG MOVES AHEAD . . .

stock rather than cast ingots. The high alloys are less sensitive to compression than to tension stresses.

The big press can produce extrusions large enough for 35,000 and 50,000 ton forging presses.

Impact Extrusions — Designers were advised to consider them for parts with: Thick bottoms, thin sidewalls, bottom projections, fluted or ribbed sidewalls, or flanges at top or bottom.

Other advantages cited were fast production, low cost, and excellent surface finish. Zero draft can be specified.

Press Forge Role — The Air Force's big presses have much to do with the increased use of forgings, says Convair. Forging size is limited only by press size.

Pressings are getting more attention. Collins Fuqua, project engineer, McDonnell Aircraft Corp., St. Louis, reports that his firm has employed up to 200; some 60 are on one model alone. It expects to use even more.

In pressing, a heated, pretrimmed blank is put in one half of a heated die. The other half is lowered and enough pressure applied to make the metal flow.

McDonnell has worked mostly with ZK60A; HK31XA has been pressed experimentally. Pressing temperatures are between 650 and 850° F. Presses are hydraulically operated.

Pressings don't need a draft angle. Conventional forgings need between 5 and 7 degrees. Pressure is roughly double that of conventional forging.

Another feature of a pressing is its ability to produce exceptionally thin ribs or legs. A leg 3 in. high, for example, has been made 0.090 in. thick. Usual practice calls for an 0.5 in. minimum thickness in such a web.

Chemical Milling — Hugh H. Muller, technical assistant, Chem-Mill Div., Turco Products Inc., Los Angeles, lists these reasons why magnesium is chemically milled:

1. The process doesn't impair physical properties — they're the same as those of standard machine milled parts.

2. There is no evidence of intergranular attack, and no apparent change in surface composition.

3. The process doesn't affect corrosion resistance. (Even so, a surface protector is recommended.)

4. The surface of parts is evenly, uniformly finished. No further sanding or polishing is necessary.

The process bypasses many machining limitations.

Cautions—Chem-milling is not a cure-all. Cuts over 0.5 in. aren't recommended. Fillet radius is about equal to the depth of cut.

Some sand castings are too porous for the process. Others are improved by it.

Welded assemblies require special handling to minimize the difference in attack rate of welded and nonwelded areas.

Diecastings—The cold chamber process dominates the field, says Dow. Its new metering system makes that process as fast as the hot chamber and eliminates many of the drawbacks. Here are some results: With little effort, an operator made 330 parts an hour—shot weight was 0.3 lb. A convertible (hot or cold chamber), multiple shot die ran 240 cycles an hour—it required 1.55 lb per shot. An AC Spark Plug die and a Castmaster No. 7 machine ran 550 cycles an hour—shot weight was 0.3 lb.

System Described — Dow said that refined molten magnesium is held in a hot steel holding pot. It's a reservoir which helps bridge the recovery period of the melting unit. Metal is protected by flux.

A heated pipe runs to the feed port of the casting machine. Metal flows by gravity and is controlled by a valve. An electric timer governs metal discharge for each pour. It automatically compensates for changes in metal level. (As the holding pot empties, the pressure goes down.)

The operator closes the die to start the cycle and removes the casting at the finish. The rest of the operation is automatic.

The metering system is said to be safer than manual ladling. The operator stands behind the parting line. He can regulate biscuit thickness at the end of the shot piston and minimize the bursting hazard when the die opens. Metal losses are comparable to those of good hot chamber practice.

Welding — A Cleveland firm,

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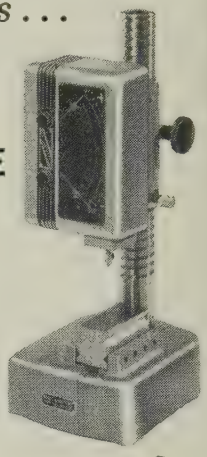

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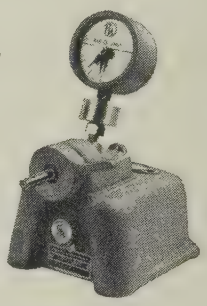

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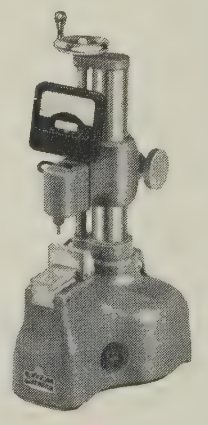

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PRATT & WHITNEY

MAG MOVES AHEAD . . .

Lite-Line Metal Industries Div., Copperloy Corp., has a modification for a standard, continuously fed welding gun that may be the answer to cheaper, more widespread use of magnesium assemblies. (STEEL, Sept. 23, p. 118.) The division makes dockboards, ramps, bridging, four-wheel trucks, and special fabrications. It uses a wide variety of plates, extrusions, and castings.

Lite-Line uses a J-1 wire continuously fed into an arc shielded with argon. A ⅛-in. plate is welded at a speed of 80 ipm. Wire speed (400 to 800 ipm) depends on plate thickness.

Example—One product is made from 19 parts and a plate 84 x 60 x ⅜ in. Tungsten arc welding takes 2 hours 37 minutes. The Lite-Line device does the same job in 55 minutes, it is reported.

In addition, heat from the tungsten arc produced warpage, and additional clamping was needed to hold the parts. The new device eliminates both shortcomings.

Other Features — Lite-Line's method requires a lot of wire. But the added cost, the firm points out, is more than offset by reduced labor costs.

The secret is a patented method of transmitting power to the wire. Conventional welding guns scrape off wire oxide at the contactor. When built up sufficiently, arcing takes place, welding the wire to the gun. Excessive shutdown time offsets speed.

The patented method eliminates arcing. It can be used with standard direct current and constant potential rectifiers. Welds are said to be about 97 per cent efficient.

Brazing—Magnesium dip brazing has progressed from a laboratory curiosity to production tool, says William J. Graves, Dalmo Victor Co., San Carlo, Calif.

His firm makes broadband waveguide systems for radar equipment. Dip brazing is preferred because fusion welding introduces shrinkage and warpage problems.

Defined — Magnesium parts are joined by dipping them in a molten flux bath. Its temperature is below the melting point of magnesium but higher than that of the brazing alloy.

The process resembles aluminum

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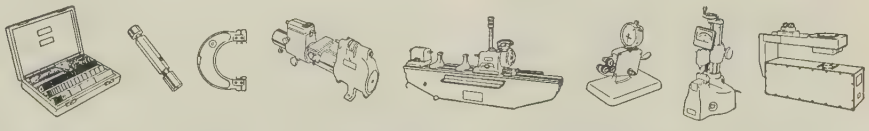

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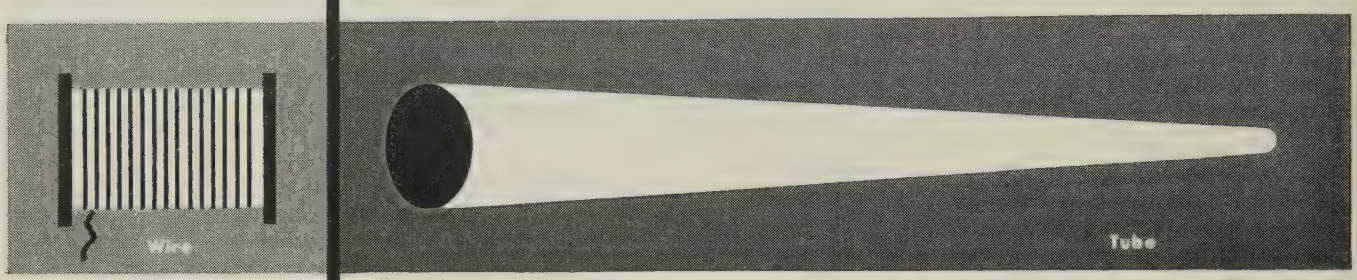
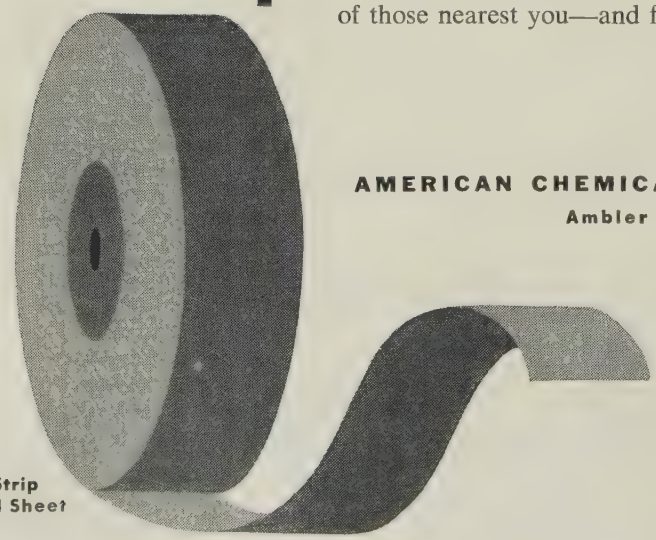


For the first time you can safely specify precoated stainless steel tube, wire, strip and sheet from your mill source—and avoid a costly installation of process equipment in your plant. The chemical conversion coating formed in the new Granodraw SS process facilitates drawing, stamping, cold heading, and cold forming operations, even after the stock has been stored. It also protects the stock against pitting in transit and storage.

Mills can supply this precoating service. Call on us for the names of those nearest you—and for complete information.



Strip and Sheet

AMERICAN CHEMICAL PAINT COMPANY
Ambler 19, Pa.

CHEMICALS ACP PROCESSES

Detroit, Mich. • St. Joseph, Mo. • Niles, Calif.
Windsor, Ont.

New Chemical Horizons for Industry and Agriculture

dip brazing. Parent metal base fillers and chloride base fluxes are used.

Materials — Dalmo Victor has had success with M1A alloy and AZ31B (FSI). The best brazing alloy so far is AZ125. Dow flux 425 seems to fill the bill.

The usual brazing preparations are necessary: Good fitup, absence of burrs, cleaning, and assembly with properly shaped filler shims and wires.

Waveguides are preheated at 850° F to evaporate moisture and to reduce heat loss in the flux bath. Parts stay in the bath 30 seconds to 3 minutes, depending on their size.

After removal, assemblies are cooled to 600° F and plunged into boiling water to remove solidified flux.

They are also dipped in Dow No. 1 for 1 minute, followed by a 2-hour boil in a 5 per cent sodium dichromate solution.

Key Considerations—Dalmo Victor suggests four important factors when you design a dip brazing fixture:

1. Make fixture as small as possible, consistent with size and weight of the part. Bigness reduces flux bath temperature and increases the amount of flux loss.
2. Eliminate flux entrapment through design simplification. Provide passageways for free flow of water.
3. Use a stainless metal for fixtures. Fluxes corrode most metals.
4. Allow for the expansion of magnesium parts. They expand more rapidly than a steel fixture when heated.

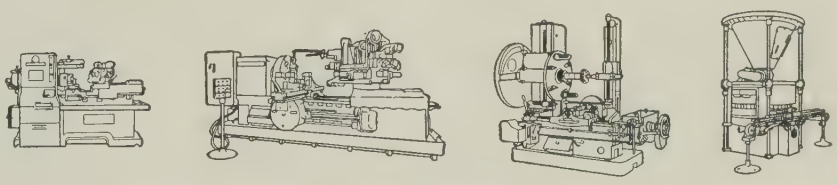
Broad Possibilities—Modern supersonic bombers, says Convair, use many metals. Here's the breakdown:

Material	Per Cent
Aluminum	49.0
Steel	16.0
Titanium	2.5
Magnesium	0.7
Plastics	4.0
Other	27.8

The figures emphasize the potential of magnesium. Convair feels that the light metal can compete with other aircraft materials. But the consensus is that responsibility for growth rests primarily with the producers.

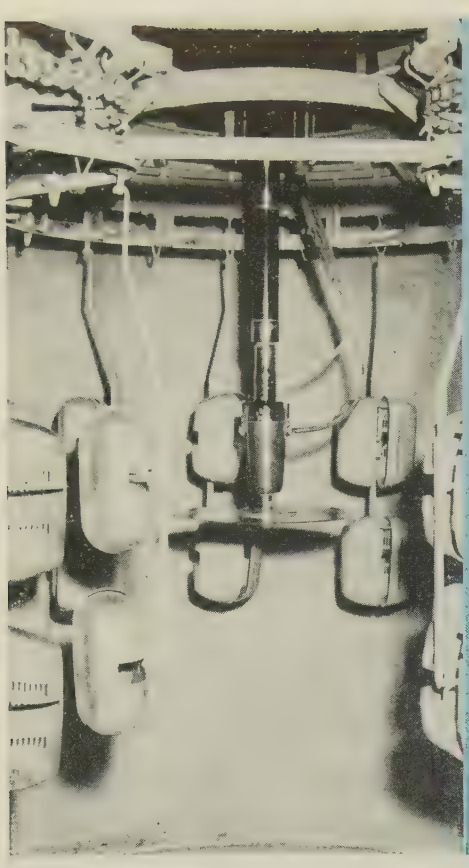
. . . and INCREASED PRODUCTION 45%!"

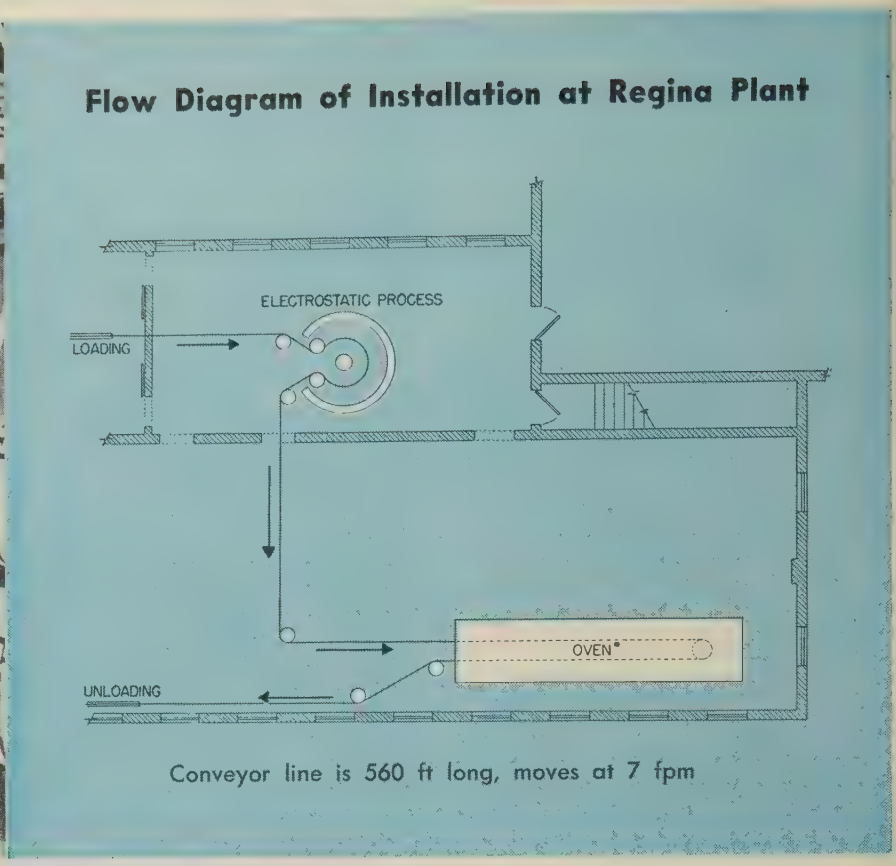
As part of a complete plant modernization program, the American Bosch Arma Corporation recently replaced 4 hand turret lathes (*2 machines on a 2-shift basis) with 2 Potter & Johnson 3-U Automatics to produce hard Nitralloy parts requiring 25 turning, facing, boring and forming cuts. Output is increased 45%, and *one* operator on *one shift* handles *both* P&J Automatics . . . releasing 3 machinists for other work. In addition, smoothness and accuracy are improved, with rejects reduced to an absolute minimum. If you are using hand lathes, you may be missing opportunities for cost savings and production gains. Write now for "34 Practical Production Ideas," information that shows how your jobs can be done the finer, faster P&J *AUTOMATIC* way! Potter & Johnson Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

P&J **POTTER & JOHNSTON**
SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.
PRECISION PRODUCTION TOOLING SINCE 1898





Aluminum housings for floor polishers are uniformly coated electrostatically as the conveyor makes a loop around the reciprocating disc. Unpainted parts enter at left

Electrostatic Spraying Cuts Costs

One unit does work which formerly required eight men. Among the advantages claimed by this firm: Less paint is used; rejects are lower; coatings have better uniformity

INCREASED demand for residential type floor polishers and vacuum cleaners prompted Regina Corp., Rahway, N. J., to improve its finishing department.

Over 90 per cent of its production is now sprayed electrostatically. The switchover from hand spraying was made with a minimum of interruption. One Ransburg No. 2 process unit is handling the work which formerly required eight handspray men.

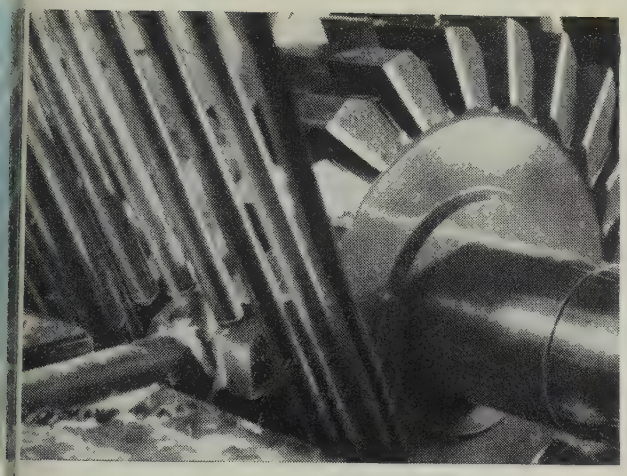
Benefits—Regina is using the same quality paint it did before, with a slight change in formulation. Fifty per cent less paint is used. Rejects are fewer. And coatings have improved uniformity.

Maintenance costs are reduced because the interior of the shield in the spray area can go for weeks without cleaning.

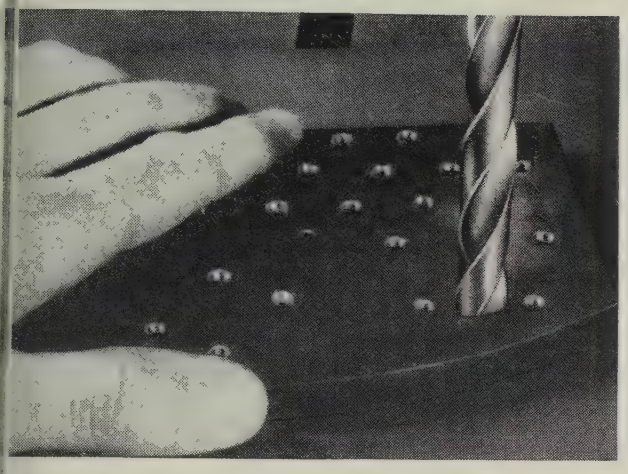
By the former method, operators racked parts on workholders. Now, five rackers and one sprayman are used on some parts which require reinforcement. Smaller parts, such as swivels, swivel clamps, and filter caps, are grouped on workholders spaced at 12 to 24 in. centers.

Handling—Parts rotate as they enter the loop in the spray area. Length of stroke on the reciprocating disc is adjustable to 48 in. which amply takes care of floor polisher handles. Some smaller pieces are hung 20 to a fixture, while only four housing covers are hung on a holder. The single reciprocating disc is 15 in. in diameter.

As parts leave the painting area, the conveyor rises over other work areas. Parts travel overhead on their way to the oven. The conveyor, which is 560 ft long, travels at 7 fpm. Parts bake at 375° F for 8 minutes in the infrared oven. From there, they go to the inspection and unloading station, then to assembly. Stockpiling of painted work is at a minimum.



Milling Cutters Do 500% More Work . . . When milling the ends of these Nichrome heater rods operators always averaged 25 cuts . . . then spent 20 to 30 minutes changing to a new cutter. In an effort to reduce such high job time, steam treated tools were made standard practice in this shop. The results: operators averaged 150 cuts before resharpening was necessary . . . 500% more use from each tool . . . 1½ hours less set-up time for every 150 pieces.



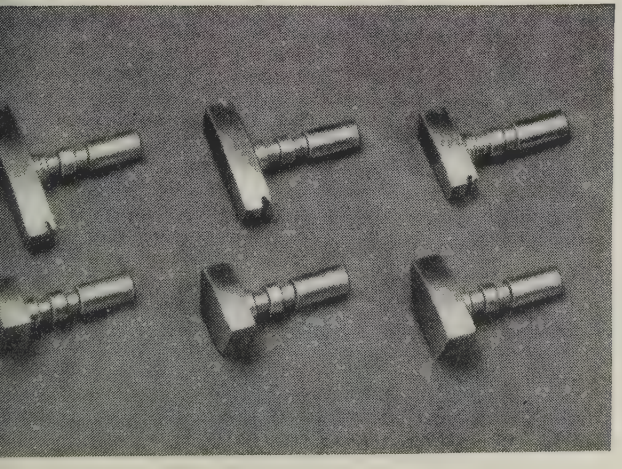
Chipping Rejects Are Eliminated . . . Drilling, reaming and boring these bakelite insulating blocks used to be an expensive job. Although the actual operation didn't take long, the abrasive action of the bakelite dulled tools so rapidly that cracking and chipping caused a prohibitively high number of rejects. The cost of the material and the large number of man-hours invested prior to the drilling operations made the problem even more acute.

To break the bottleneck, steam treated tools were tried. Previously, one tool was good for about 10 holes, with an average reject rate of one out of four blocks. With steam treated tools, the average went up to 25 holes and rejects were no longer a critical factor.

Drill Maker Improves Product Quality . . . The manufacturer of these drills made extensive tests before adopting the steam Homo method as standard treatment for all milled flute regular and heavy duty drills. Here are comparative test results on a 37/64" H.S. drill cutting a 2" billet of S.A.E. 3240 chrome-nickel steel with a Brinell hardness of 248-255 at a speed of 345 RPM, feeding 52 FPM at .007"/rev.

Treatment	Drill No.	1st Test	2nd Test	3rd Test
None	1	33 holes	43 holes	38 holes dull
None	2	31 holes	43 holes	60 holes still cutting*
Steam treated	3	62 holes	64 holes	60 holes still cutting*
Steam treated	4	50 holes	69 holes	60 holes still cutting

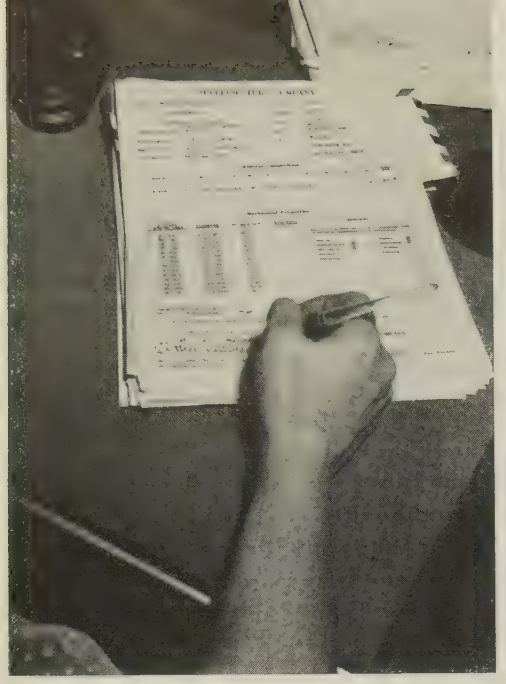
*Drill #2 was steam treated before this test. Drill #3 was given an additional steam treatment before this test.



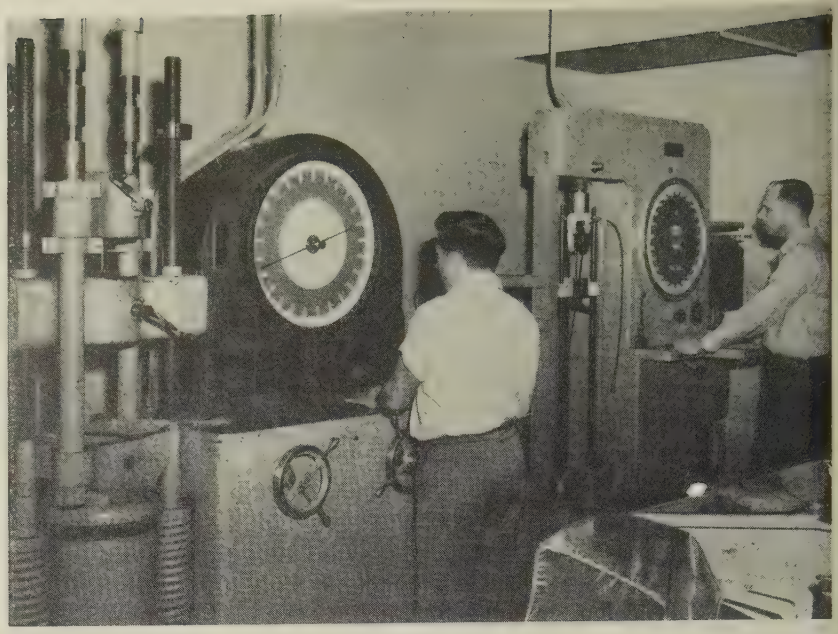
Pick-up From Soft Metal Eliminated . . . A production bottleneck was created when a batch of formed nickel stock, used to make these segments of multipoint switches, came through too soft. Pick-up on the form tool of the automatic screw machine kept ruining the parts.

When experiments with different tool steels and sharpening methods completely failed to solve the problem, a steam treated tool was tried. This one tool finished the entire run of 3000 pieces and was still in good condition. Production delays because of material variations are no longer a problem in this shop.

LEEDS & NORTHRUP
Instruments
Automatic Controls • Furnaces



These reports are being notarized to assure that the products meet upgraded specifications



Tensile testing is done on a 60,000-lb machine (left) and a 5000-lb machine (right). A furnace can be attached for hot testing

Lab Organization for Complex Specs

Centralized control over all testing operations has speeded material and product checks for this tube manufacturer. Incorrect specifications are minimized by knowledge of end use

By JAMES W. WAMBOLD
Test Engineer
Superior Tube Co., Norristown, Pa.

CO-ORDINATING the test reports demanded by the atomic age's complex specifications is often more involved than testing procedures. To meet this problem, Superior Tube Co., Norristown, Pa., has devised a system of tight control that expedites the testing and assures that the specifications are met.

Its policy requires that all of the specifications and necessary tests be entered on the order sheet before entering the order for production and that all the approvals be checked off before shipment.

Determining Specs—The end use is the most important factor in setting up the specifications. The ideal order will not carry production requirements or end properties but it should give a detailed description of the end use.

The metallurgical department selects the type of tubing that is best fitted for the job. This avoids over or under specification.

Focal Point—Since all orders require some mechanical testing, the Mechanical Test Section is responsible for the original order sheets, tests for mechanical properties and expediting and releasing final approvals.

Another responsibility of the group is furnishing the customer with notarized reports of the properties if necessary. These are particularly valuable where the customer is making a component used in another product.

Order Makeup—A file of tubing specifications including military, society (such as ASTM and SAE), and Superior's own purchasing specifications facilitates order dress-up.

About 90 per cent of the orders call for routine procedures. The remaining 10 per cent require consultations with the metallurgical, chemical, metallographic, sales, and production departments to determine tests to fit the case.

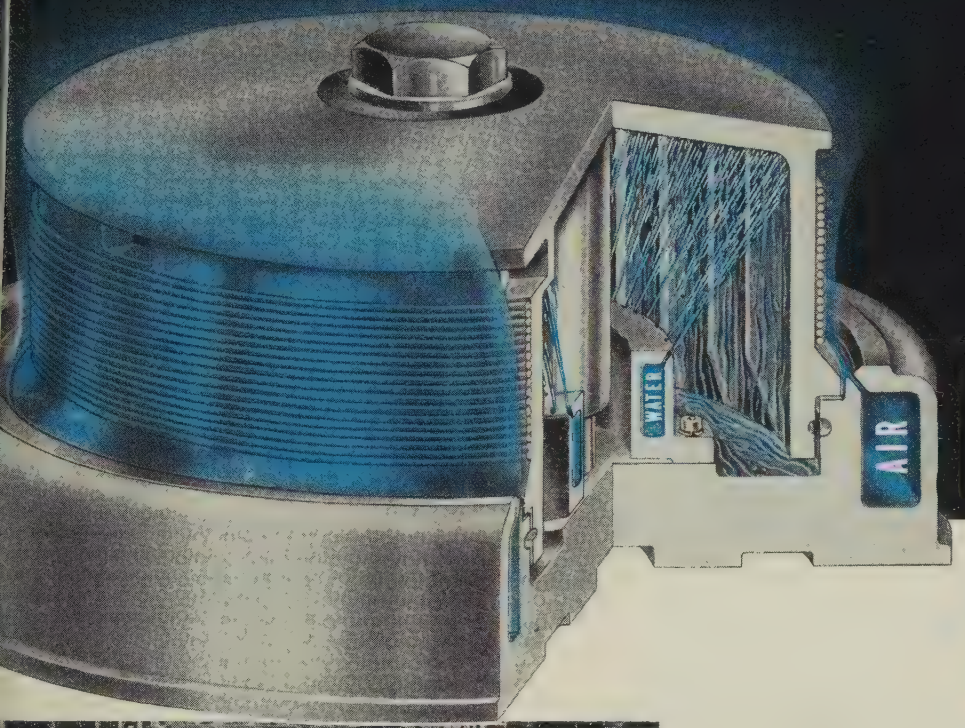
Tensile Tests—All tubing, except shaped and needle tubing, is given at least two. Orders over 2000 ft call for an additional test for each 5000 ft. More are made if specified.

Shaped tubing is not checked for tensile strength because: 1. It is not practical to manufacture jaws for the different shapes. 2. Cal-

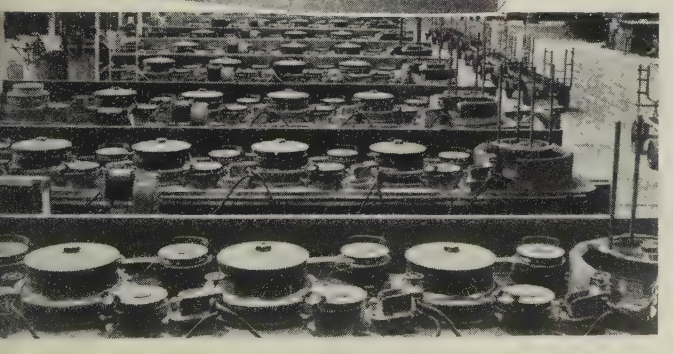
Vaughn® MOTOBLOC® MOTOBLOX®

Double-Cooled

with AIR and WATER



for perfect wire condition from start to finish!



Vaughn DOUBLE-COOLED blocks insure desirable temperatures for high carbon wire all the way through the draw—thanks to advanced engineering that provides *both* air and water cooling. Each block is equipped with an annular air blast for external cooling of the wire, while water jets impinging on the inner finned block walls remove heat continuously and effectively.

• *Let us discuss the benefits to your wire on your operation!*

The Vaughn Machinery Co., Cuyahoga Falls, Ohio, U. S. A.

"Quick on the Draw!"

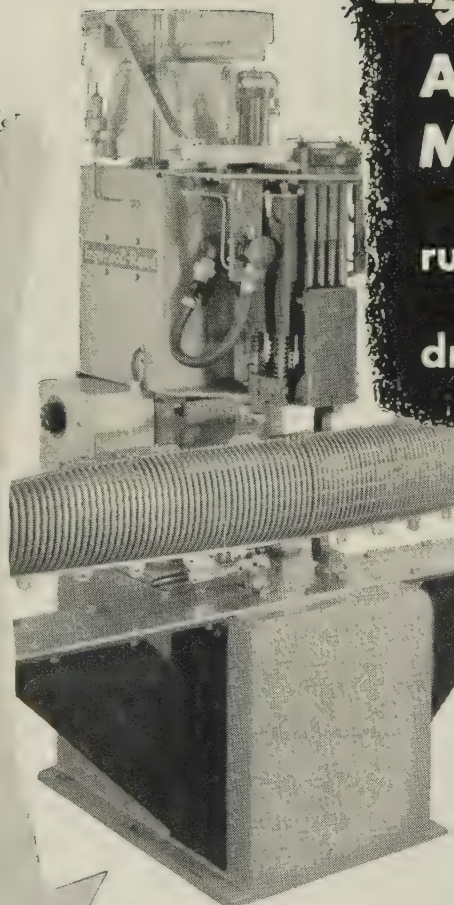
COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

put the f-a-s-t in fastening

... and improve quality, too ...

with **Ingersoll-Rand**

ASSEMBLY MACHINES for running nuts and driving screws!



- first in experience
- first in quality
- first in service

Any bolt size ... any number of spindles ... maintains desired torque manual or completely automatic operation. Write for an Ingersoll-Rand AIRengineer to survey your needs.

Automatic assembly machine feeds and drives four self tapping screws in three seconds.

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Ingersoll-Rand

11 Broadway, New York 4, N.Y.

Materials requiring hardness specifications are tested on Rockwell hardness machines

COMPLEX SPECS . . .

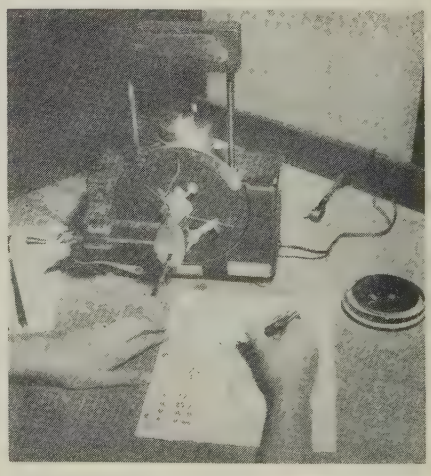
culation of cross sections is inaccurate. Other methods, such as hardness, are used to determine mechanical properties.

Needle tubing is tested for stiffness rather than tensile strength since stiffness is more closely related to yield point.

Tensile tests are made after the final straightening operation, except for material requiring cold working. In this case, preliminary measurements are made while the tubing is being drawn down to make sure that it will end up with the specified properties.

Yield strength is important in many cases. It is determined by either the offset method or the extension-under-load method.

Hardness Tests — Rockwell machines are used: A standard Rock-



Needle tubing is checked for stiffness by measuring the deflection under a load in a cantilever beam stiffness tester

COMPLEX SPECS . . .

well reading the A, B, C, and F scales directly and a superficial tester with the N and T scales for light-wall sections.

Bending, flattening, and crushing tests are used when required. Special properties checked include microstructure and a stripping strength for clad products.

Other Sections — The Metallography Section examines finished tubing for grain size, carburization and decarburization, metallurgical structure, bore configurations, and the presence and depth of imperfections.

Embrittlement, salt spray, and acid tests are performed by the Chemistry Section in addition to chemical analysis on raw materials and finished tubing.

All new alloys are checked for special properties before they are considered for production.

Improvised Rope Tester

A salvaged air cylinder is the heart of this machine. It tests slings used to handle tubes

SPARE parts were used to build a rope tester at Calumet & Hecla's Wolverine Tube Div., Detroit, where tubes in process are handled by 5000 rope slings to prevent marring.

Construction—The framework of the tester is an 18-ft H-beam supported by four braced angle iron legs. An 8-in. ID air hydraulic cylinder with a 15-in. stroke has a hook mounted on the plunger. This hook runs in a groove so that it does not twist as the rope is put under tensile load. A second, stationary hook is mounted at the other end of the beam.

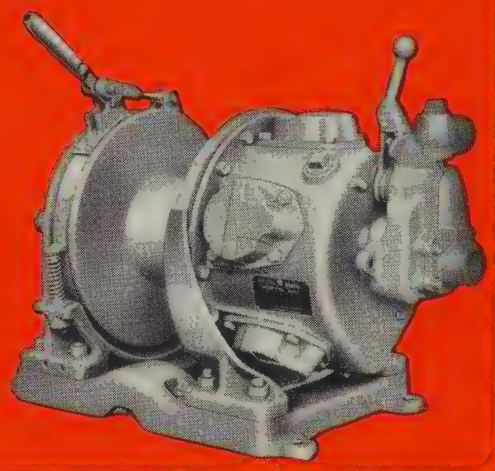
Testing—Loop ends of a sling are placed on the hooks. A pressure regulating valve cuts the 80-psi air supply to the cylinder in half to provide a 2000-lb load for testing.

A sling in satisfactory condition will creep, then hold steady. A faulty sling will continue to creep until it breaks.

Slings are tested at least once a month as part of the plant safety program.

...any way you look at it...

this is your BEST BUY in



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Pioneered by Ingersoll-Rand

Mounts in any position your job requires. Easily dolly-mounted for portability. This complete line of winch-type Ingersoll-Rand Single Drum "Utility" Air Hoists meets every hauling and hoisting need for loads from 750 to 4000 lbs. Backed by dependable Ingersoll-Rand engineering for long, trouble-free service and high efficiency.

For applications requiring small or heavy-duty overhead hoists, check the Ingersoll-Rand hoist line for capacities up to 24,000 lbs.

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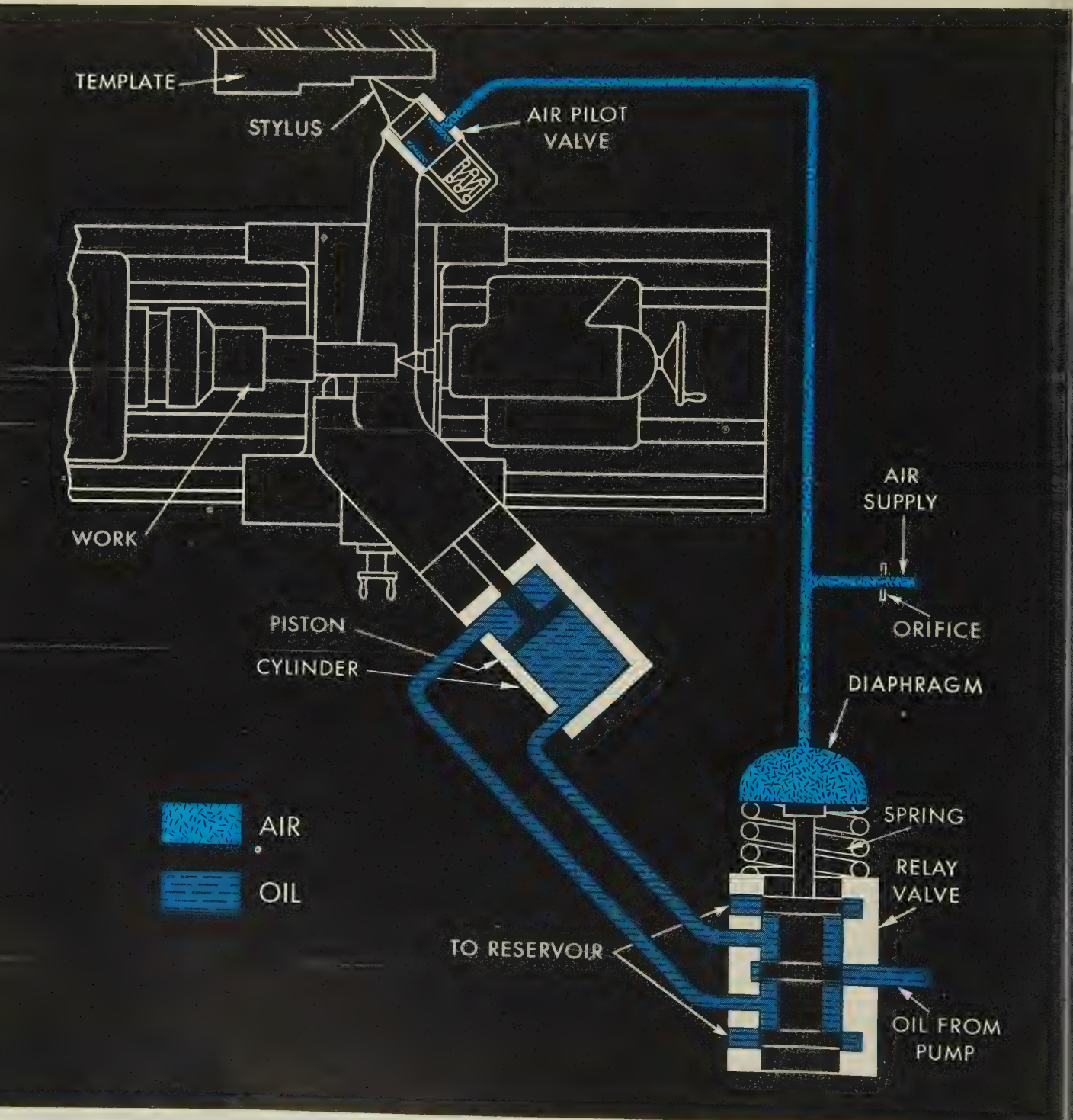
It's a breeze

to cut costs, boost production and quality with the Monarch "Air-Gage Tracer"

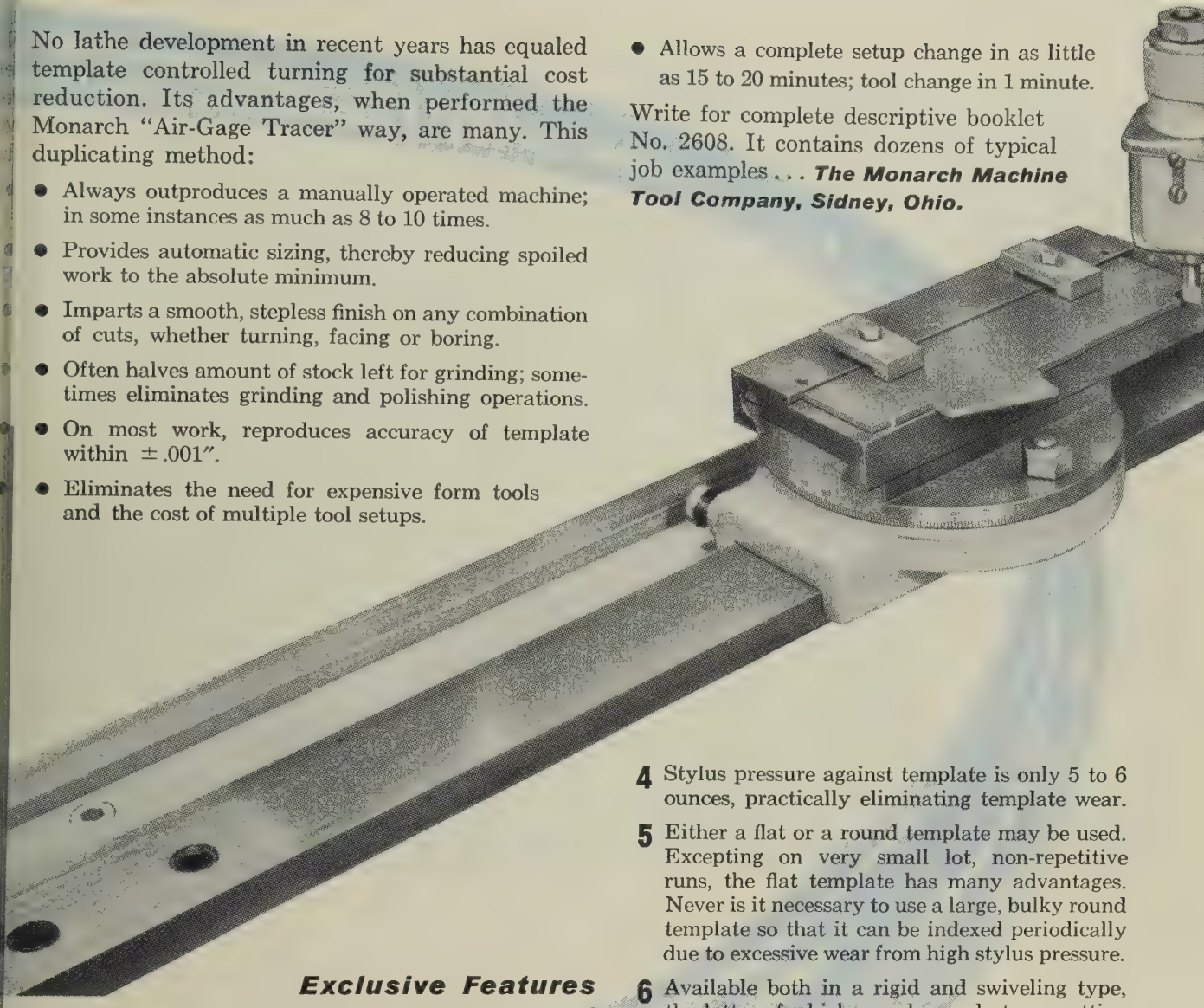


The above diagrammatic drawing shows the simplicity of Monarch "Air-Gage Tracer" operation. As the design deals with both air and oil in constant motion, reaction in the power cylinder is within a few thousandths of a second after the tracer changes position. Result —super-accuracy piece after piece, job after job

No lathe development in recent years has equaled template controlled turning for substantial cost reduction. Its advantages, when performed the Monarch "Air-Gage Tracer" way, are many. This duplicating method:

- Always outproduces a manually operated machine; in some instances as much as 8 to 10 times.
- Provides automatic sizing, thereby reducing spoiled work to the absolute minimum.
- Imparts a smooth, stepless finish on any combination of cuts, whether turning, facing or boring.
- Often halves amount of stock left for grinding; sometimes eliminates grinding and polishing operations.
- On most work, reproduces accuracy of template within ±.001".
- Eliminates the need for expensive form tools and the cost of multiple tool setups.
- Allows a complete setup change in as little as 15 to 20 minutes; tool change in 1 minute.

Write for complete descriptive booklet No. 2608. It contains dozens of typical job examples . . . ***The Monarch Machine Tool Company, Sidney, Ohio.***



Exclusive Features of the "Air-Gage Tracer"

1 The only lathe duplicator which utilizes the combination of air-hydraulic control. That's the secret of its super-accuracy.

2 The air circuit is an open loop servo system which provides air-gaging and multiplies both force and motion.

3 It's the simplest and most trouble-free of all lathe duplicating methods. Tracer head maintenance is never a costly problem.

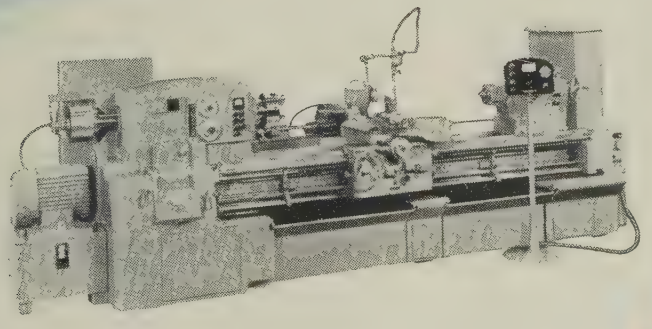
4 Stylus pressure against template is only 5 to 6 ounces, practically eliminating template wear.

5 Either a flat or a round template may be used. Excepting on very small lot, non-repetitive runs, the flat template has many advantages. Never is it necessary to use a large, bulky round template so that it can be indexed periodically due to excessive wear from high stylus pressure.

6 Available both in a rigid and swiveling type, the latter of which may be used at any setting between 45° and 90°. Universal nature of swiveling type a "must" for top production on many complex facing and boring operations.

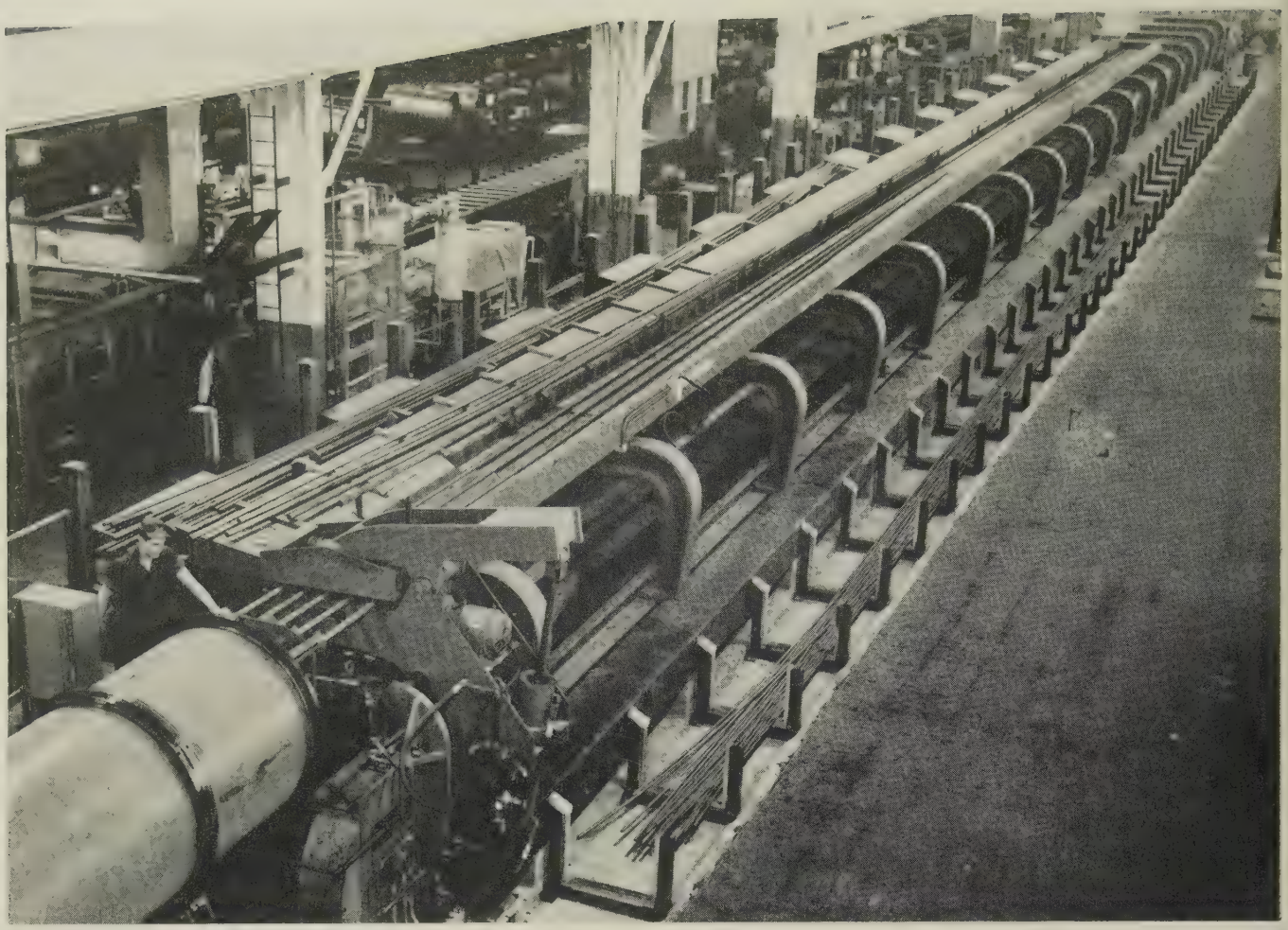
7 The only lathe duplicator offered optionally with full automatic cycling and potentiometer feed control.

8 Backed by almost 30 years' experience in the field of tracer controlled turning. Thousands of "Air-Gage Tracer" lathes attest to its acceptance by industry everywhere.



Above is a Monarch Series 62 Preselector Dyna-Shift Lathe with "Air-Gage Tracer" and auto cycle unit. This duplicating means may be factory applied to all lathes in the Monarch line. They may be converted to conventional manual operation merely by the flick of one lever. The "Air-Gage Tracer" is also the heart of such Monarch production lathes as the Mona-Matic, Hydra-Slide and Right Angle.

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
FOR A GOOD TURN FASTER
. . . TURN TO MONARCH



Drawbench, 400 ft long, handles five tubes at once. A 500-hp motor supplies 150,000-lb pull to redraw tubing first drawn on a triple tube breakdown bench

New Mill Ups Tube Production

Firm adds 243,000 sq-ft floor area, outsize drawbench, magnetic inspection. Plant is said to be one of the best examples of automatic tubemaking. Maximum length: 9000 ft

THE drawbench in the above illustration is said to be one of the world's largest for copper tubing.

It is 400 ft long and handles five tubes simultaneously, drawing them from 43 ft into lengths up to 210 ft.

The machine is part of a multi-million dollar addition to Chase Brass & Copper Co.'s Babbitt Road plant, Cleveland. Included are circular inverted drawblocks; automatic drawing, straightening, cutting to length, and recoiling; vapor degreasing; a double-deck vertical tube drawblock; straightening and tempering; annealing; and electronic inspection.

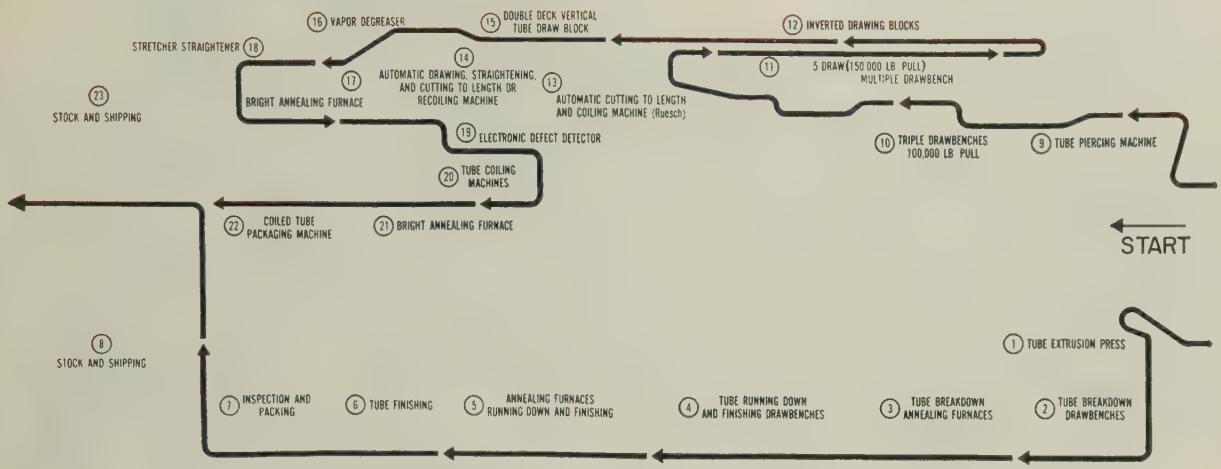
Big Pull—The mill can make copper tubes 9000 ft long in coils 65 ft in diameter.

The 400-ft drawbench handles ¾ to 2 in. raw tubes. A double drawchain transmits a 150,000-lb pull to the head which travels between 110 and 330 fpm.

Drawing Blocks — Circular inverted drawblocks redraw straight tubes up to 210 ft. Finished tubing is rolled into coils which contain as much as 3000 ft. Speeds range from 150 to 2000 fpm. A 200-hp motor delivers a 10,000-lb pull on the blocks.

An operator inserts a coil of tube. As lengths are drawn, they are rewound on a drum. Coils drop to a conveyor. Another operator cuts off the used point on the tube, and puts on a new one for the next draw.

Cut to Length—An electronical-



Chase Brass makes tubing by extrusion and billet piercing. Production lines are separate. Upper line contains the newest equipment

ly controlled machine converts large coils of hard drawn tubing into straight lengths up to 60 ft. It can also measure and recoil the tubing. The equipment includes automatic drawing to final diameter and straightening.

Small Tubing—The plant uses a double deck, vertical tube drawblock to redraw ¼-in. tubes into size down to 0.070 in.

Large coils contain 9000 ft. Drawing speed is 430 to 1290 fpm.

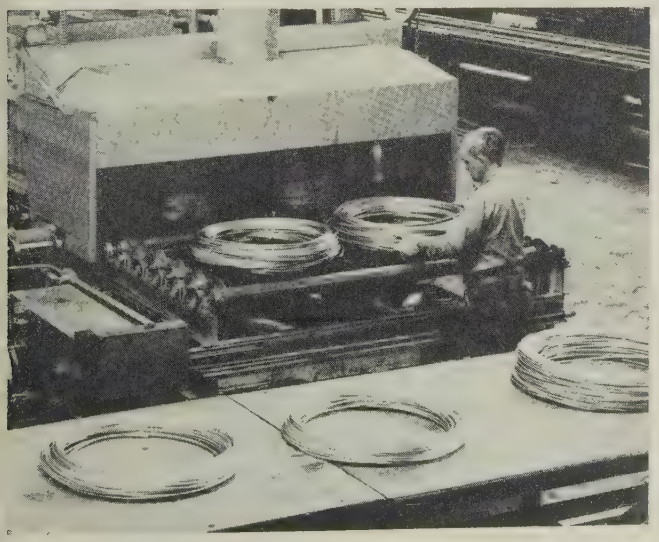
Another automatic converts large coils from inverted drawblocks into smaller coils of precise length. It will handle 1-in. tubes in 60-in. coils at speeds up to 500 fpm.

Defects—All tubing is inspected electronically. Internal or external defects are detected by the device (below, right) which automatically marks faulty areas and rejects tubing.

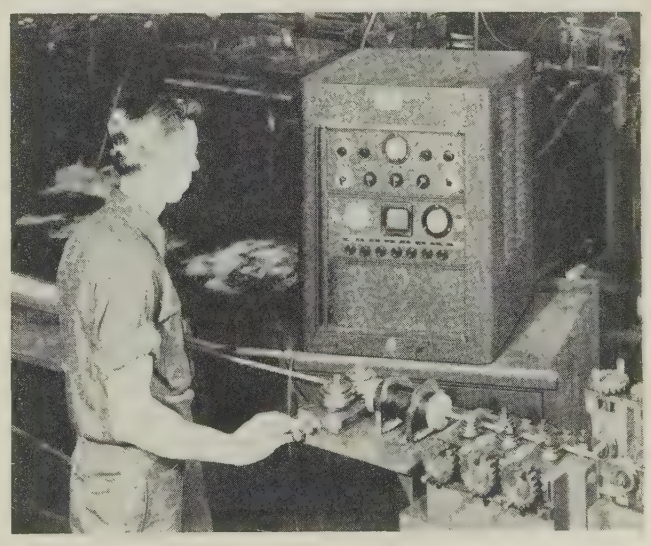
The machine is tied in with the automatic drawbench, cutting to length and recoiling.

Straighten — One straightener cold works annealed tubing to a specified rigidity. The other stretches several tubes at once. Tubing size is largely ⅜ in.

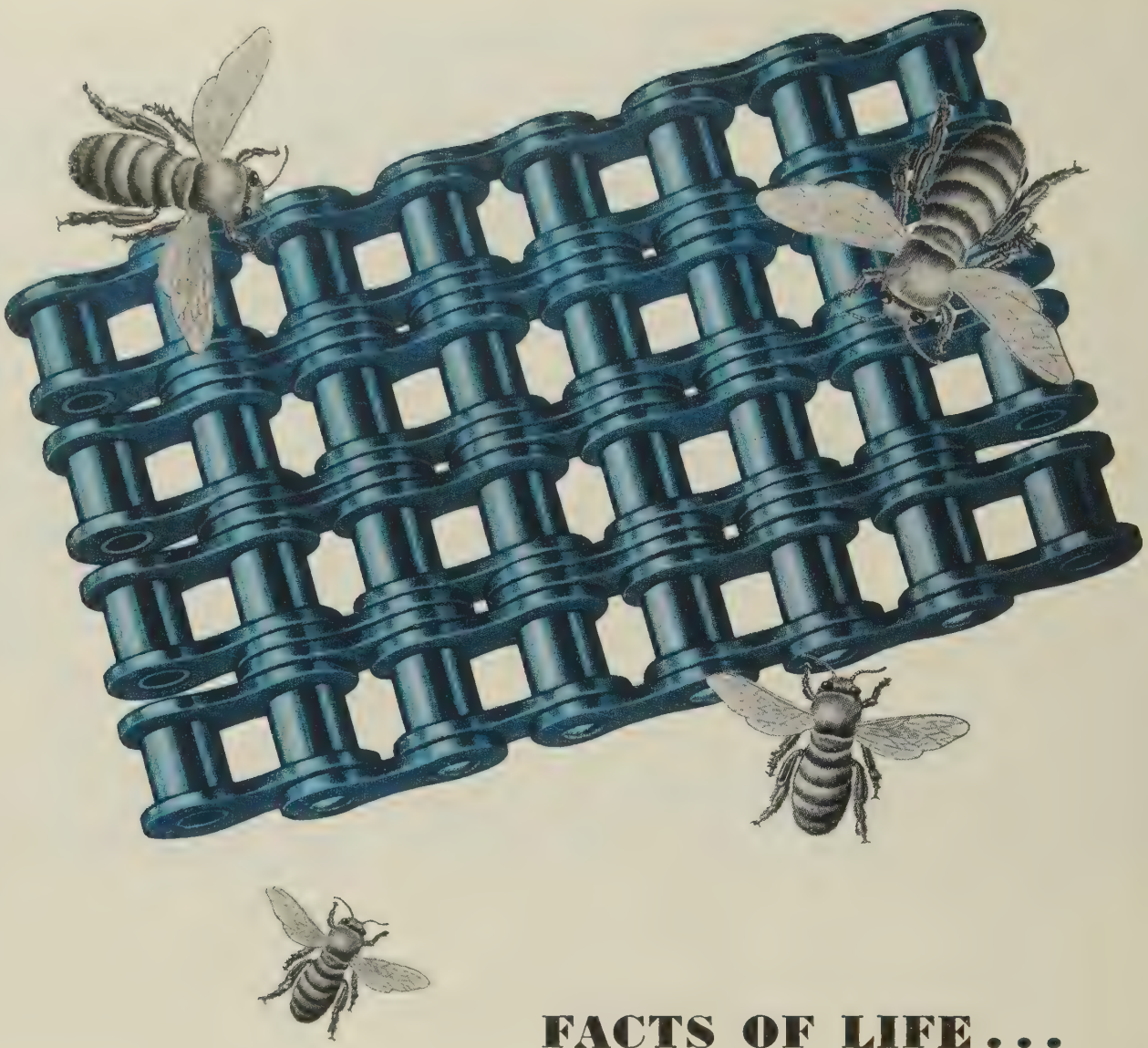
Bright Anneal — A continuous furnace handles tubing coils on rollers. Heat is provided by gas heated radiant tubes. A controlled atmosphere insures freedom from oxide formation.



Controlled atmosphere and gas heated radiant tubes insure oxide-free surfaces during annealing of coils or straight lengths. Furnace hearth is roller type



This magnetic detector marks and ejects faulty tubing. Internal and external defects are indicated. Chase says the device greatly improves quality



FACTS OF LIFE . . .

Facts which concern the designer of modern equipment are top efficiency, adaptability and minimum over-all cost.

Whitney's Self-Lubricating Single and Double Pitch Roller Chain and *fatigue resistant* Processed Roller Chain are design advancements answering these needs for machinery manufacturers and users in many industries.

First, Whitney's amazing Self-Lube Chain outlasts regular chain by as much as 5 to 1 under toughest field conditions of continuous exposure to dust and moisture. Here, Whitney's exclusive sintered steel chain bushings "oil cleanly from the inside" . . . are prelubricated for life, cannot trap abrasive matter that cuts chain life. Ideal for applications in food, drug, textile and many industries where external chain lubrication is not practical or desirable.

Whitney's exclusive *fatigue resistant* Processed Roller Chain is establishing new service standards for durability, particularly on problem drives involving unusual operational conditions, stresses and heavy shock loads. This performance comes from the exclusive Whitney *fatigue resistant* process which offsets excessive operational stresses in the chain.

These new dynamic, balanced chain designs serve better, longer and at less over-all cost. And so does the entire Whitney line of A.S.A. Roller, Silent and Conveyor Chain Drives . . . all precision engineered for top quality.

Whitney Field Engineers provide nation-wide consultant service, backed up by company operated warehouses and alert Whitney Distributors offering a complete off-the-shelf stock service. If you want RESULTS specify WHITNEY CHAIN.

CREATORS OF SELF-LUBE CHAIN

Whitney

CHAIN COMPANY

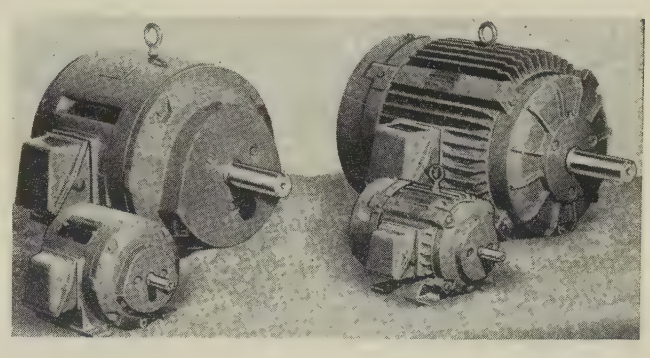
249 HAMILTON ST., HARTFORD 2, CONN.

ROLLER CHAIN • SILENT CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS

Alternating Current Motors Are Totally Protected

This line of large Series D motors uses NEMA frame sizes 364U through 445U. The complete line includes motors from 1 to 125 hp. The motors may be specified in many speeds with Class A, Class B, or high-temperature Class H insulation.

Part-winding starting (to eliminate loading of power supply lines which results in momentary light dimming) is available for commercial air conditioning and similar applications. *Write*: Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio. *Phone*: Redwood 2-7000



Lathe Turns Large Diameters and Odd-Shaped Workpieces

Model 6039F swings 60 in. over the ways and 49 in. over the cross slide.

The headstock is driven by a 40-hp motor and has 24 spindle speeds in true geometric progression. Speeds range from 6 to 750 rpm (alternate, 3 to 375 rpm) in forward or reverse. Two levers are used to set the desired speed.

A totally enclosed gearbox provides 81 feeds and 45 leads.

A horsepower meter is built into the headstock. Constant lubrication is provided for all gears and other moving parts.

Antifriction bearings are used throughout. *Write*: Axelson Mfg. Co., Los Angeles, Calif. *Phone*: Ludlow 7-1271

Quenching Press Has Automatic Loader and Unloader

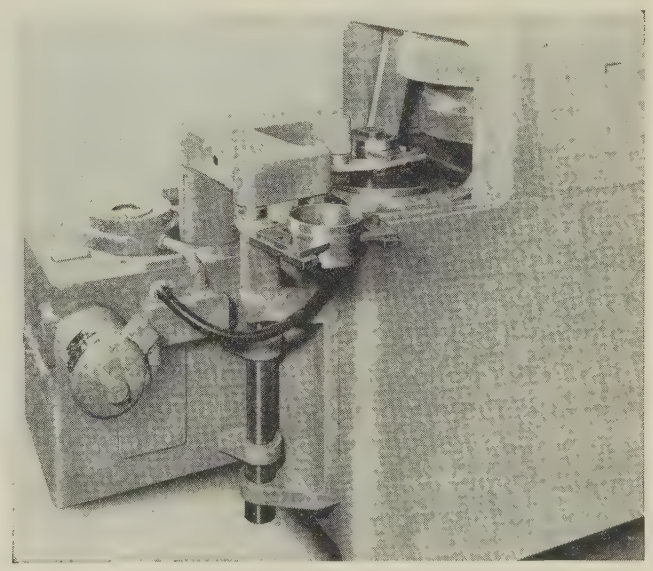
This unit attaches to the front of No. 16 or No. 26 quenching presses and loads and unloads at the same time.

The mechanism is cam controlled, and a Geneva plate indexes the arms of the unit from the load to unload position. The arms are at 90 degrees to each other; one arm completes the loading action, while the other completes unloading.

The unit assures positive control of quality, as the time element from the furnace to the quenching press is uniform for each part.

The quenching presses accommodate round, flat, or irregular shaped parts up to 25 in. in diameter. Quenching is automatically controlled at all stages of the cycle. Parts are held between precision dies during the quenching cycle, and are correctly hardened with a minimum of distortion.

Sequence: Parts to be quenched are delivered from the furnace to a point under the load arm of the unit when the lower die of the quenching press is in the forward position. The load and unload arms lower. The load arms clamp on the part to be quenched, and the unload arms lower on the part previously quenched. The arms raise and are rotated 90 degrees. The arms lower and the jaws open. The quenched part is released into a tote basket or onto a conveyor, and the part to be quenched is released on the die. The lower die of the quenching press swings back into the press, and the arms swing 90 degrees back to the original position.

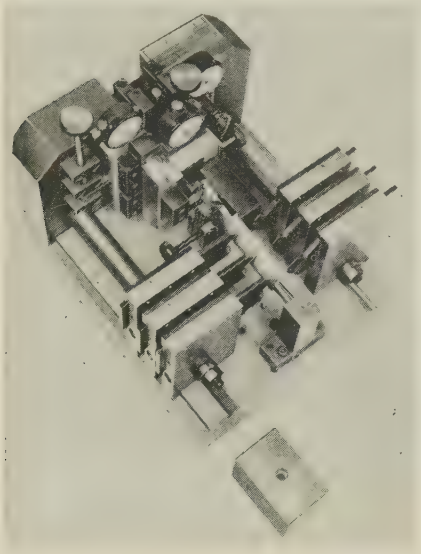


At the end of the preset quenching, the lower die of the press swings out to the unload position. *Write*: Gleason Works, 1000 University Ave., Rochester 3, N. Y. *Phone*: Greenfield 3-1000

Gage Checks Jet Blades

Blades of any length can be checked by this gage. Template alignment accuracy is held to 0.0002 in.

The airfoil template holders are mounted on hardened and ground ways on the base of the unit.



The template holders are positioned by interchangeable master gage bars.

The blade being checked is positioned in a clamping device where it is located axially from the blade mounting surfaces. The clamping device is swivel and slide-mounted to indicate both blade twist and displacement.

Templates engage the foil section of the blade to indicate form accuracy as well as blade tilt and bow. *Write*: Shepard & Young Tool Co., 15150 Telegraph Rd., Detroit 39, Mich. *Phone*: Kenwood 3-2720

Production Lathes

Many features of this line of lathes (17 and 20 in. swing sizes) can be specified by the customer.

Speed ranges of 70 to 700 rpm or 105 to 1050 rpm are available on the 17-in. lathe. On the 20-in. model, speed ranges of 57 to 600 rpm and 85 to 900 rpm are available.

Any or all the following features can be added to the basic machine: Hydraulic tracing, automatic facing, air-operated chucks, quick-

acting tailstock, connected rests, tapper attachments, turret tool posts, and cross and length stops. *Write*: R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. *Phone*: Jefferson 1-0910

Welding Control

This weld-cycle control unit provides programmed control of all functions of machine Heliwelding. The unit consists of a main panel which contains all the adjustable control mechanisms, and a push-button remote control station.

Timing mechanisms are set in advance to meet requirements of the job. The start switch initiates welding which progresses automatically until the weld is completed and the crater filled.

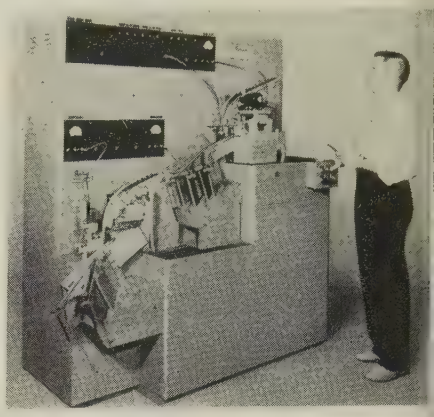
Weld time may be set from 1 second to 2 minutes. Other ranges up to 20 minutes are available.

Write: Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y. *Phone*: Murray Hill 2-6700

Inspection Machine

This electronic machine can inspect over 3000 engine valves an hour. It automatically checks the concentricity of the valve seat and stem, straightness of the valve stem, head thickness, and over-all valve length.

Either in-process or finished valves can be checked. The gage heads which check the dimensions operate on a radar-type reflected wave circuit using a frequency of 30 million cycles a second. Gages can operate to 0.000001 in. con-



stantly. *Write*: Arlin Products Inc., 13451 Auburn Ave., Detroit 23, Mich. *Phone*: Vermont 8-4473

Floor Surfacing

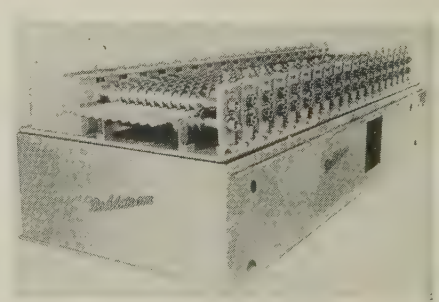
Monile is a high strength, impact and chemical resistant floor surfacing which is poured into place. It can be applied to concrete or wood. It is not necessary to cut out old floors since a ½-in. layer of the material is recommended.

The dense stone is formed by chemical reactions that take place when a copolymer liquid is mixed with a pulverized composite. *Write*: Master Mechanics Co., 2097 Columbus Rd., Cleveland, Ohio. *Phone*: Prospect 1-2630

Roll Former

Galvanized steel, aluminized steel, and plain and embossed aluminum can be corrugated by this roll forming machine. Gages 20 through 28 can be handled.

Roller die tooling of ½ or ⅞ in. depths provides good control of coverage and depth. *Write*: Dahl-



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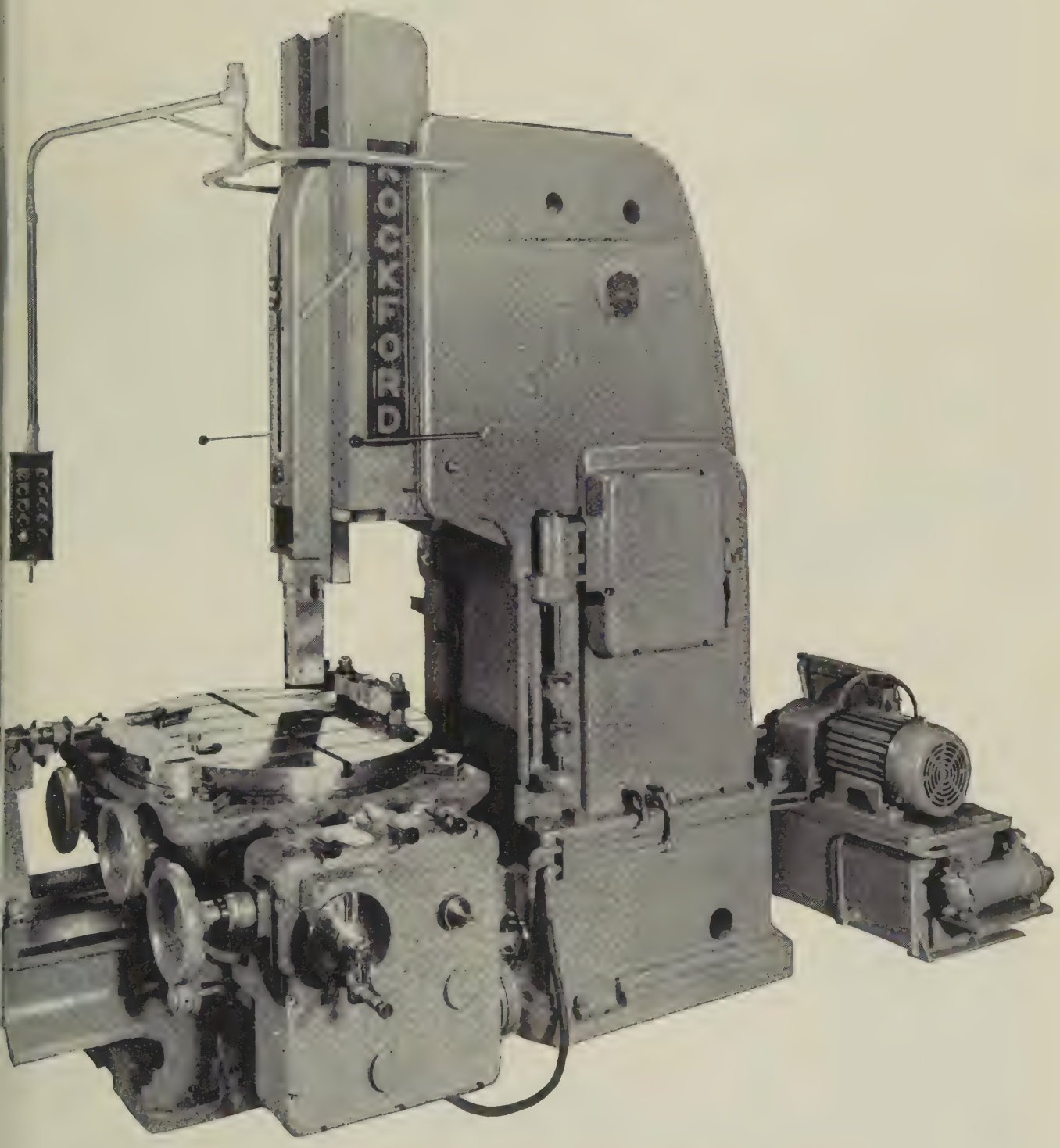


ROCKFORD MACHINE TOOL CO.

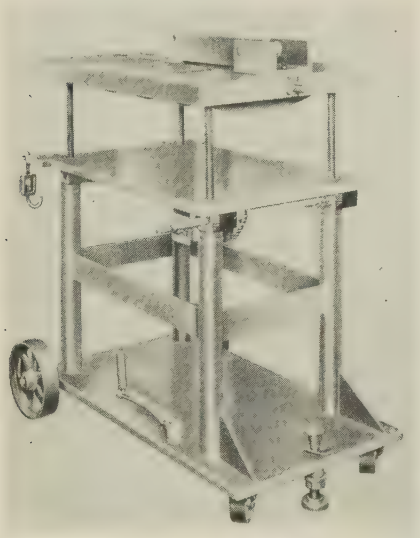
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

strom Machine Works Inc., 4227 W. Belmont Ave., Chicago 41, Ill. *Phone*: Spring 7-3670

Die Transfer Table

Big Beulah can handle loads up to 2500 lb, raise or lower them, and slide them to another surface.

The reinforced top plate is 22 x 34 in. It is fitted with eight recessed, free-rolling conveyor rollers for ease in moving loads.



A ram pushes or pulls loads. An extension enables loads to be pushed into a press or onto a shelf 14 in. from the front edge of the top plate.

The top plate can be adjusted from 35 to 60 in. above the floor level. *Write*: Hamilton Tool Co., 848 S. Ninth St., Hamilton, Ohio. *Phone*: Twinbrook 4-8358

Bulk Materials Cooler

Materials discharged from rotary kilns, sintering machines, roasters, and furnaces can be run through this horizontal-grate cooler. Sizes handled range from foundry sand to clinkers and pellets.

Movable and stationary grates are alternated. Because the grates are on a horizontal plane, material is pushed by the movable grates up and over the stationary ones.

Resistance of the material against this movement causes immediate horizontal spread. Wider and shorter coolers can be used where needed.

Cooling air from the air chamber is forced through the horizontal spaces between the grates, and through the vertical openings in each grate.

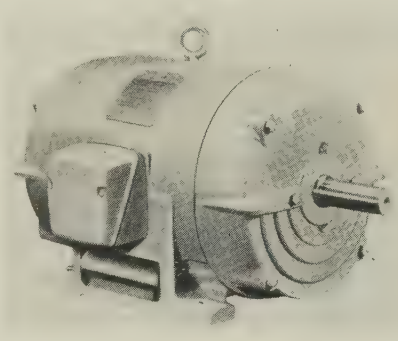
Constant motion of the movable grates continuously changes position of material as it is tumbled from one grate to another. This speeds cooling by exposing all surfaces of material to the flow of air. *Write*: Fuller Co., Catasauqua, Pa.

Motor Saves Space

The Syncro-Spede is a synchronous induction motor built in the same NEMA frame size as a standard motor of equal horsepower.

The motor accelerates as an induction motor but runs at exact synchronous speed without permanent magnets or direct current excitation.

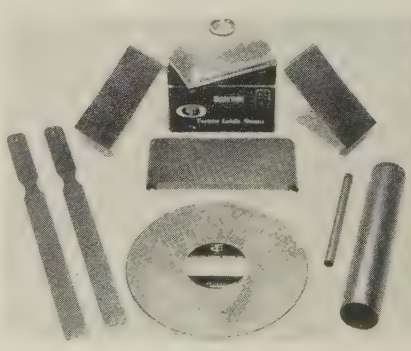
The alternating current motor is suited for uses which require constant speed under varying loads.



Ratings from 1 to 100 hp are available in any enclosure type. *Write*: Dept. P, Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis. *Phone*: Humboldt 1-6000

Abrasive Grit

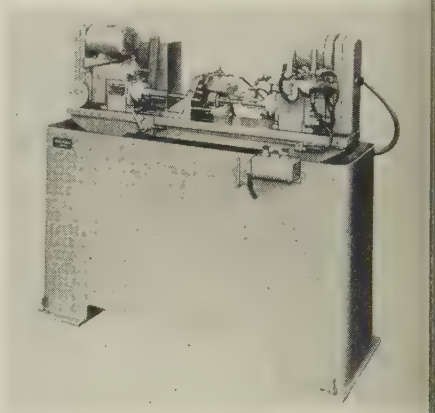
This tungsten carbide abrasive, Kengrit, comes in standard grit sizes from 24 to 240. It has hard, sharp cutting edges that will not break or round off.



The abrasive can be used in many sanding applications. Surfaces prepared with the material resist loading up. *Write*: Kennametal Inc., Latrobe, Pa.

Double-End Machine

Parts up to 28 in. long can be drilled, centered, spotfaced, chamfered, reamed, tapped, threaded, hollow milled, or bored on this machine. It performs opposed operations simultaneously.



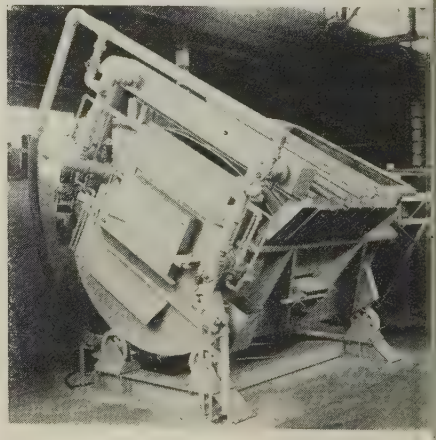
The machine can be used with a small index table, manual or air clamp fixtures, or hopper or vibration feeds.

The base of the machine is equipped with a coolant tank, pump, chip tank, and coolant trough. *Write*: Hartford Special Machinery Co., Hartford, Conn. *Phone*: Jackson 5-1401

Aluminum Furnaces

The SWB series of tilting, reverberatory furnaces is fired by gas or oil. They are easily charged, fluxed, alloyed, and cleaned.

The furnaces are made in 1000, 1700, 2500, and 3000 lb holding capacities with hourly melt rates

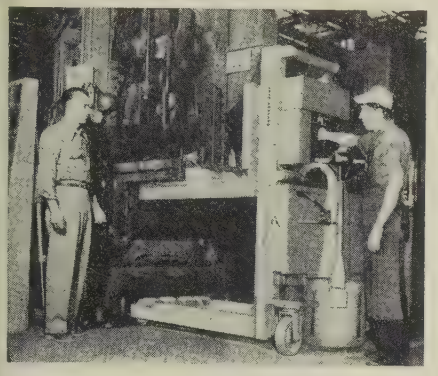


closely paralleling the rated capacities.

Hot metal can be provided from a cold start in 1 to 1½ hours. *Write*: Stroman Furnace & Engineering Co., Franklin Park, Ill. *Phone*: Gladstone 5-2412

Truck Handles Dies

The JackStacker walkie truck can handle dies weighing up to 7500 lb. The truck can stack dies in storage racks, as well as transport them and place them in press beds. Power is electric.

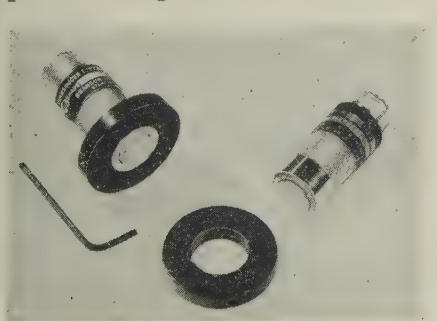


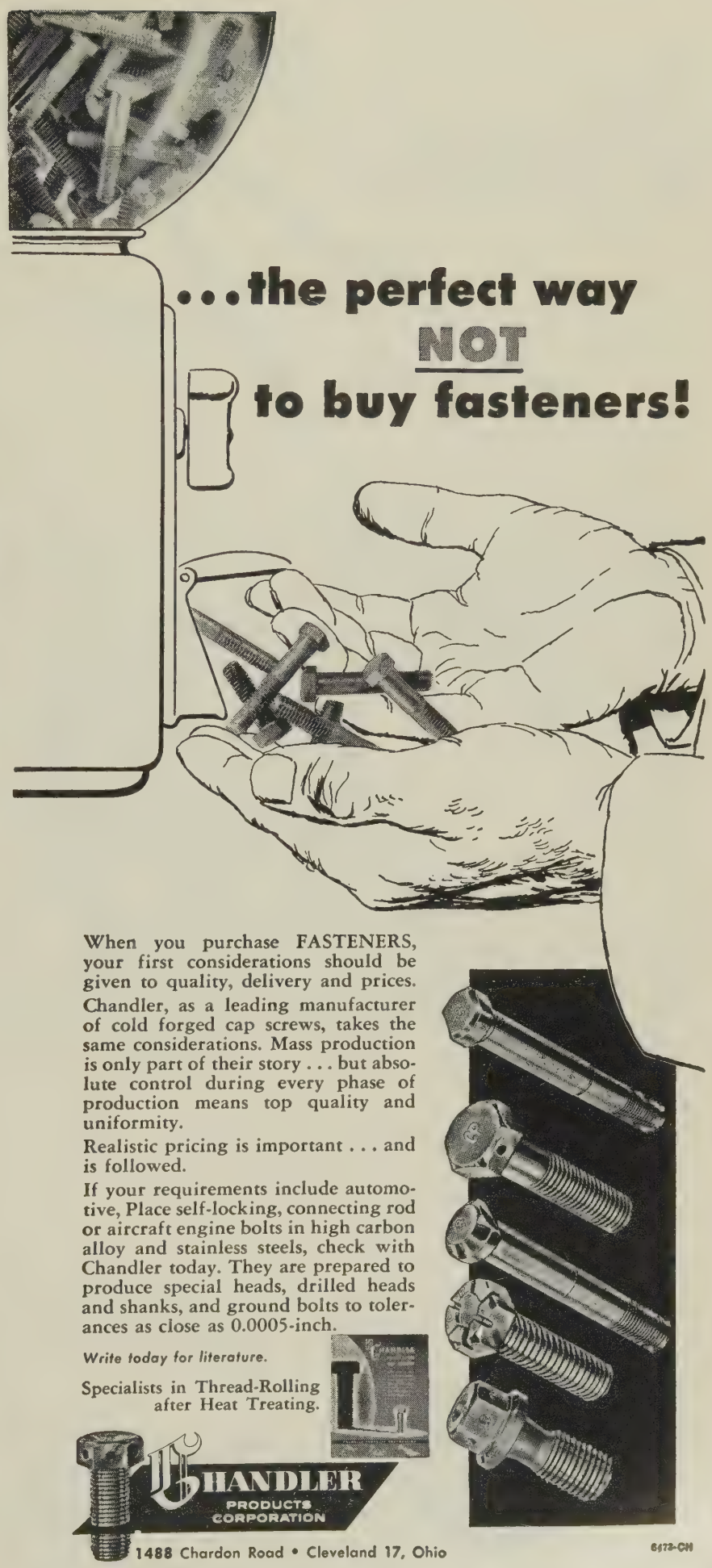
Dies are either pulled on or pushed off the platform by a hydraulic unit. The platform is 32 x 42 in. It can lift 42 in. *Write*: Dept. R-120, Lewis-Shepard Products Inc., 125 Walnut St., Watertown 72, Mass. *Phone*: Watertown 4-5400

Thickness Tester

Lead, laminated plastics, castings, and severely corroded sections can be tested by the Type Z ultrasonic transducer. It will check thickness and for flaws. Access to only one side of the work is required.

The tester is waterproof and can be operated continuously at temperatures up to 250° F. *Write*:





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You're almost certain to circle one of Milford's five manufacturing plants!

There's hardly a metalworking plant in the country that isn't within overnight trucking distance of one of Milford's five manufacturing plants. And 20 sales offices add to the convenience of ordering and *getting* rivets when you need them NOW!

To improve product appearance and strength
. . . to take full advantage of automatic assembly
. . . to cut delivery time and production costs
—get in touch with Milford first!

THE MILFORD RIVET

MILFORD RIVET & MACHINE CO.

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ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

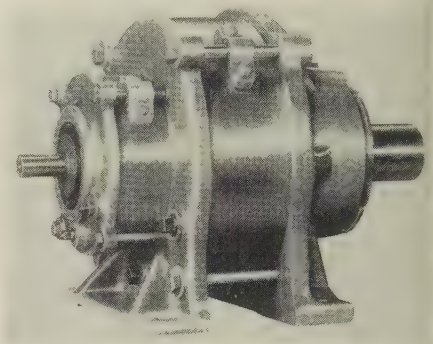
NEW PRODUCTS and equipment

Branson Instruments Inc., 40 Brown House Rd., Stamford, Conn. *Phone*: Davis 4-6721

Speed Reducers

This line covers the range from 28 to 18,219 hp at 1600 rpm with a 3.5:1 reduction.

A small gear reducer can be attached to a much larger one. The large unit has more than enough capacity to carry the heavy output shock loads, and the input reducer is designed for high speed to balance the design.



A reduction gear can have the same output and input capacity. *Write*: Crichton Co., Johnstown, Pa. *Phone*: Johnstown 9-5633

Fork Truck

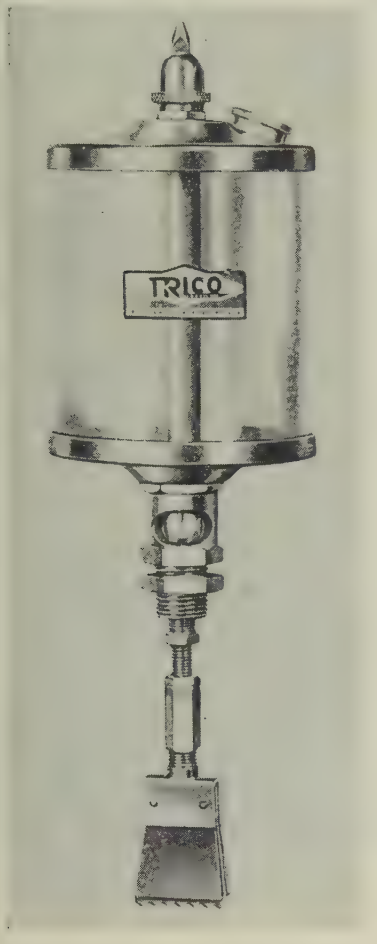
This truck can travel forward, backward, or sideways (to the right or left). One load wheel is a free-wheeling caster; the other is hydraulically adjustable to conventional travel or is turned 90 degrees for side travel.

Loads 14 ft or longer can be

handled in aisles as narrow as 7 ft. Trucks have capacities up to 4000 lb. *Write*: Raymond Corp., 91-159 Madison Ave., Greene, N. Y. *Phone*: 204

Chain Oiler

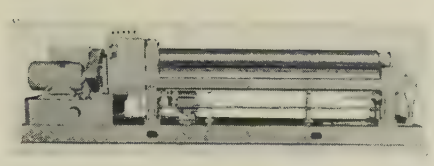
This oiler automatically applies a film of oil to chains, gears, slides, or irregular surfaces. It can be mounted at any convenient location.



Precision needle valves meter the oil to the applicators. The applicators withstand temperatures up to 275° F. They can be trimmed to any width to avoid overhang and side dripping. They do not spread or become distorted. *Write*: Trico Fuse Mfg. Co., 2948 N. Fifth St., Milwaukee 12, Wis. *Phone*: Concord 4-3410

Bending Roll

Model R3L-R is an initial type plate bending roll. It is built in sizes from 4 to 10 ft long. Gage



sizes go up to 5/16 in.

Regardless of the amount of opening for different thicknesses of plate, the gear teeth are in full mesh at all times. Totally enclosed worm gears are used for the adjustment of the rear roll. *Write*: Webb Corp., P. O. Box 549, 402 E. Broadway, Webb City, Mo. *Phone*: 29

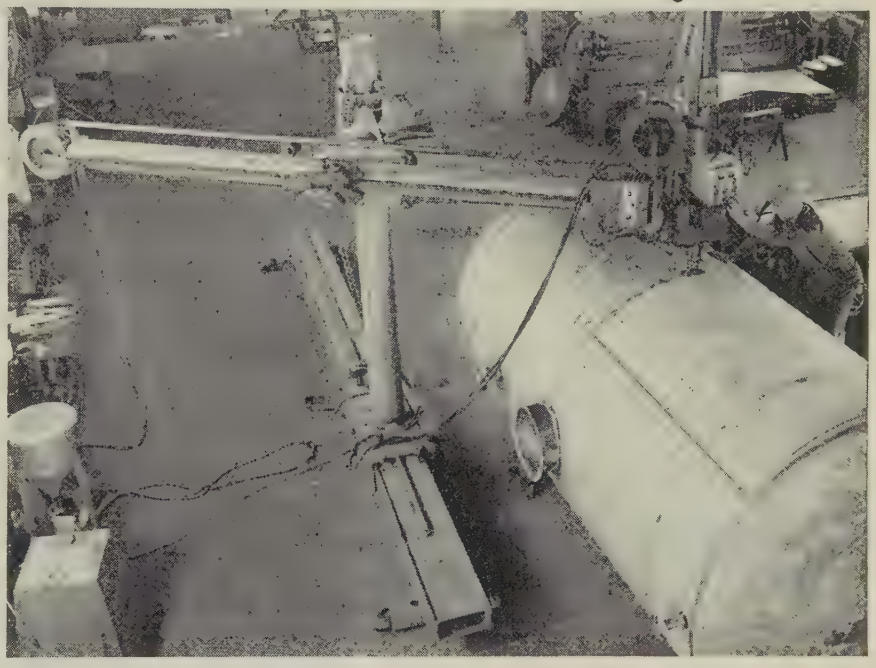
Strip Coating

Strip-Kote is a plastic emulsion which dries to a transparent tough film. It protects smooth and wrinkled metal finishes, stainless steel, and polished aluminum from mars or scratches during processing, shipment, or storage.

The coating is applied by brush or spray gun.

The dried film is flexible and easily stripped. *Write*: Chemical Consulting Service, 3711 S. Clement Ave., Milwaukee 7, Wis. *Phone*: Humboldt 1-4570

Lower the boom on welding costs!



with LEWIS AUTOMATIC WELDING HEAD MANIPULATORS

Designed and manufactured by a weldment fabricator, the LEWIS line of manipulators is *functionally engineered* for profitable automatic welding. Three classes of precision machines are available to meet diversified production requirements.

The BANTAM Series . . . new, portable, pedestal-base manipulators designed for weld seams and working heights up to 8 ft. These lightweight machines pilot fully-automatic heads . . . feature 360° boom rotation.

The UNIVERSAL Series . . . versatile, portable, fully-adjustable manipulators that provide boom travel and working heights up to 12 ft. Available with track or pedestal type bases and a variety of precision control systems.

The HEAVY DUTY Series . . . large car-type units for floor rail installations. Boom travel and working heights range up to 24 ft. Power source and auxiliary equipment carriage-mounted. Also available with operator's station at boom tip.

FOR DETAILS AND SPECIFICATIONS, WRITE FOR NEW BULLETIN 7703 . . . or call BEdford 2-2500.

LEWIS

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THE LEWIS WELDING & ENGINEERING CORP.
Welding Division
103 NORTHFIELD ROAD • BEDFORD, OHIO

SPECIALISTS IN WELDMENT FABRICATION AND PRECISION WELDING EQUIPMENT

How to Select and Apply

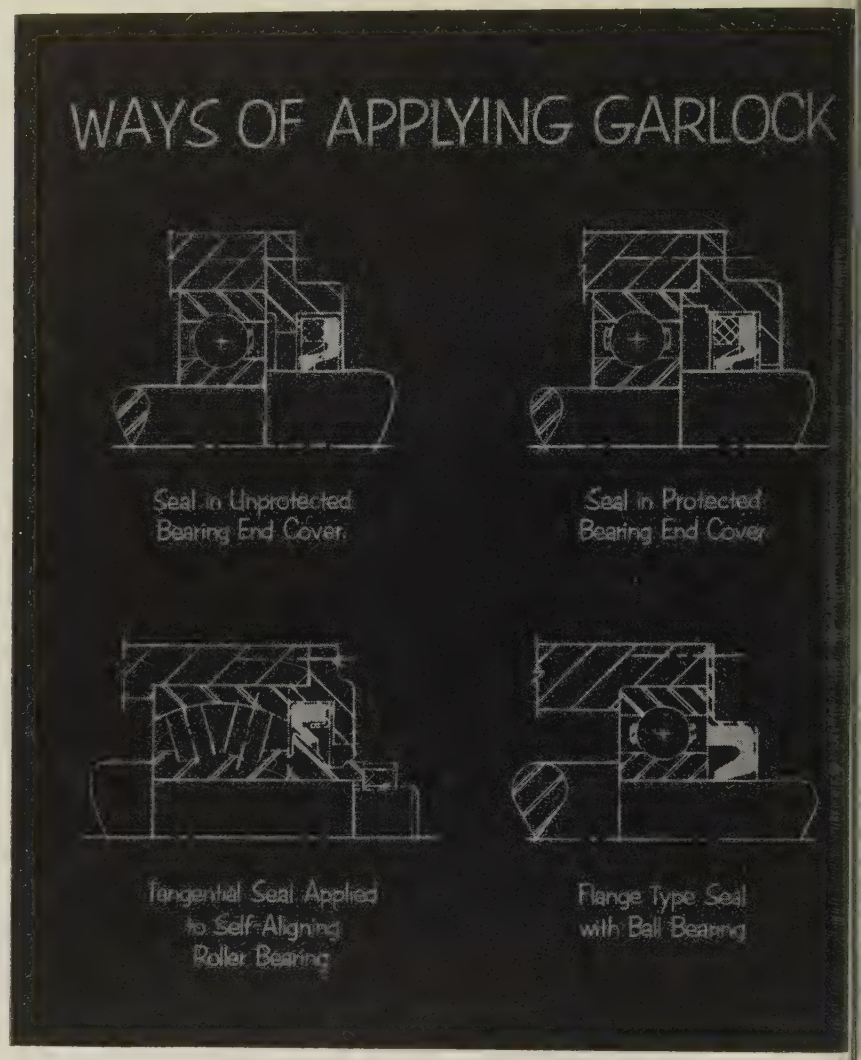
Selecting a Seal

Any ball or roller bearing seal must do two things: (1) It must keep lubricants in; and (2) It must keep dirt and grit out.

Factors to consider when selecting a seal are whether the shaft operates at high or low speed, whether the bearing load is heavy or light and whether the operating temperatures are high or normal. Also remember that the sealing of oil requires a more efficient seal than the retention of grease.

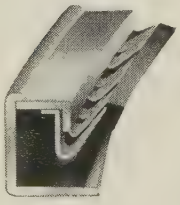
Seal Types

There are, of course, many kinds of seals used to protect bearings to some degree. Unit or lip type seals, such as the Garlock Klozure* Oil Seals illustrated, provide the best protection for automobiles, tractors and industrial machinery.



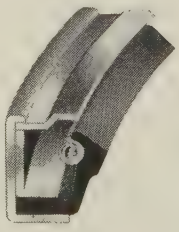
A

shows a Garlock Springless Klozure Oil Seal used where heavy lubricants are to be contained and dirt excluded.



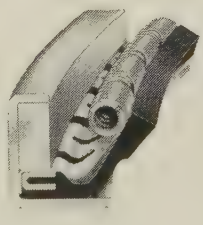
B

shows a Klozure with finger spring, very efficient for normal and high speed oil sealing on all size shafts.



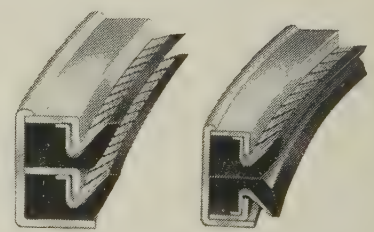
C

shows a lip type Klozure with garter spring for sealing oil at normal and high speeds on shafts from 1″ to 10″.



D

shows a Klozure oil seal with combination finger and garter spring for use on large shafts operating under severe conditions.



E **F**

Klozure Oil Seals are also available in dual tandem (E) or dual opposed (F) constructions for unusual sealing problems caused by operational or environmental conditions.

*Registered Trademark

NEW literature

Write directly to the company for a copy

Induction Melting Furnace

This 4-page bulletin describes a 60-cycle coreless furnace for ferrous and nonferrous metals. Ajax Engineering Corp., Trenton, N. J.

Brush Plating

This 12-page bulletin describes brush plating with the Dalic process for jobs such as touching up; resizing of mismachined parts; precision fitting of bearings; electroforming corrections; cold welding, soldering, and brazing; and automatic wire and strip plating. Marlane Development Co., 153 E. 26th St., New York 10, N. Y.

V-Belt Drives

This 108-page engineering catalog, A661, covers the selection and operation of V-belt drives. Sections cover standard, variable speed, and special drives, plus sheaves, bushings, and hubs. Tables cover pre-engineered drives, horsepower capacities, belt speeds, center distances, sheave diameters, and other data for special drives. Dodge Mfg. Corp., Mishawaka, Ind.

Heat Resistant Castings

This 30-page technical manual lists the properties of high alloy heat resistant castings. Room and elevated temperature properties of 14 alloys are listed. Applications, design, and fabricating characteristics of each alloy are discussed and the metallurgical structure and characteristics described. Alloy Casting Institute, 268 Old Country Rd., Mineola, N. Y.

Cutters and Accessories

Catalog 37C, 96 pages, describes end mills; T-slot, Woodruff key seat, milling, sprocket, and gear cutters; arbors; adapters; collets; vises; index plates; work driving dogs; taper mandrels; expansion bushings; and spring chucks. Brown & Sharpe Mfg. Co., Providence, R. I.

Waste Disposal

A channel pipe made of vitrified clay for disposing of corrosive wastes is described in this 4-page bulletin. Logan Clay Products Co., Logan, Ohio.

Tubing Coatings

Bulletin ERW-TSL No. 3 describes the various protective coatings used on welded carbon tubing. Tubular Products Div., Babcock & Wilcox Co., Beaver Falls, Pa.

Stampings

This 6-page bulletin illustrates deep drawn stampings for a variety of parts. Applications range from electronics to pinsetting machines for bowling alleys. Stamping Div., Transue & Williams Steel Forging Corp., Alliance, Ohio.

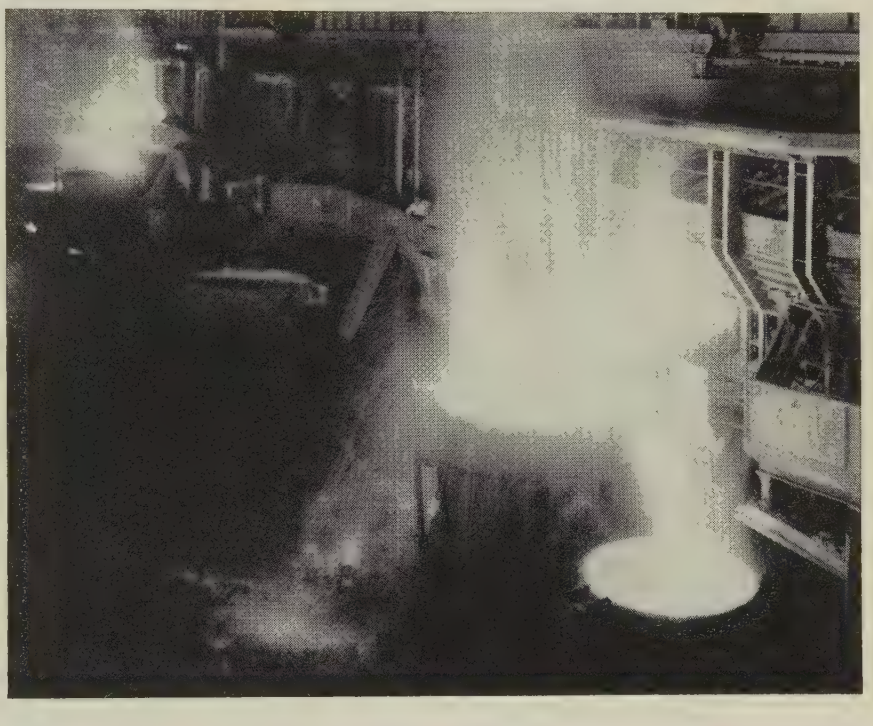
Stainless Steel

Factory made stainless steel components used by architects and builders are described in this 44-page manual. Committee of Stainless Steel Producers, American Iron & Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Steel Tubing

Bulletin CS-58 describes carbon and alloy seamless steel tubing in mechanical, aircraft mechanical, airframe quality, and pressure grades.

(*Please turn to Page* 236)



Increase production of your existing open hearths

We concur with the opinion of many steel plant operators that modernization of existing open hearth facilities represents an economical and often overlooked way to materially boost annual tonnage—with a minimum capital investment.

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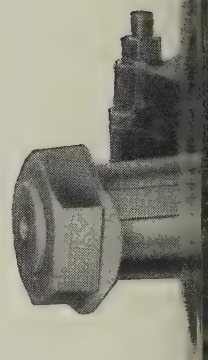
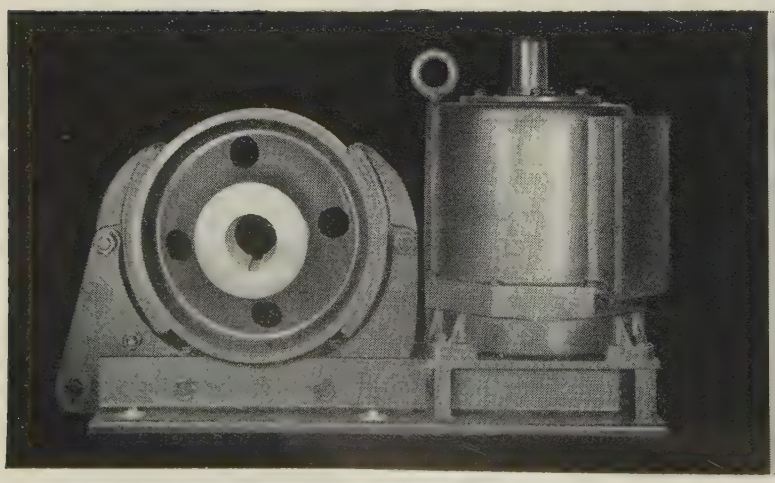


Silicone insulation for longer motor life . . . improved field coil design for greater capacity and cooler operation . . . heavy-duty shaft, bearing and housing design to take high torque loads . . . make the Westinghouse Hevi-Duty Mill Motor the most rugged package of power you can buy.

New silicone insulated armatures and the exclusive Westinghouse solid mass design with multi-dip finishing make it five times tougher for load surges to affect armature coils.

Maintenance is easy, too. New openings in lower frame give quick, easy access to commutator and brush rigging for inspection or repair. Silicone-insulated armatures and field coils are interchangeable with old-style units.

For complete information on the outstanding Westinghouse Hevi-Duty Mill Motor, call your Westinghouse sales engineer. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pennsylvania. Ask for B-6547. J-22049



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NEW LITERATURE . . .

Electric-resistance welded steel is covered in mechanical and pressure grades. Ohio Seamless Tube Div., Copperweld Steel Co., Shelby, Ohio.

Vibrating Conveyors

A line of vibrating screens, feeders, and conveyors is described in Bulletin 1475, 6 pages. Dravo Corp., Neville Island, Pittsburgh 25, Pa.

Lathe Tools

Turning tools, knurling attachments, swing tools, back rests, drill holders, tap and die holders, and toolholders for automatic screw machines and turret lathes are covered in this 32-page catalog. R & L Tools, 1825 Bristol St., Philadelphia 40, Pa.

Magnetic Clamps

Holders and clamps for work to be welded are described in a 2-page bulletin. Aronson Machine Co., Arcade, N. Y.

Instrument Gears

Over 2000 precision instrument components are covered in supplementary Catalog 13, 64 pages. Listed are 24 to 200 pitch spur gears, antibacklash gears, couplings, and other products. PIC Design Corp., subsidiary of Benrus Watch Co. Inc., 477 Atlantic Ave., East Rockaway, N. Y.

Welding Electrodes

This 24-page guide identifies electrodes by grade and type, chemical and physical analysis, color code, and suggested use. Metal & Thermit Corp., Rahway, N. J.

Fasteners

Bulletin 106, 16 pages, covers the design and use of solid headed parts—rivets, nails, screws, and other fasteners and small parts. John Hassall Inc., Westbury, N. Y.

Speed Measurement

Four ways of using a potentiometer recorder to measure speed to 0.1 per cent accuracy are described in Bulletin GET-2741. General Electric Co., Schenectady 5, N. Y.

Pins and Bushings

Catalog 70-A, Section 3, is an 8-page bulletin describing a line of guide pins and shoulder guide pins. E. W. Bliss Co., NBC Bldg., Cleveland, Ohio.

Motor Control

High voltage starters for 2300 to 5000 volt motors are described in Bulletin 14B8507, 8 pages. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Brake Sets

Brake blocks for industrial uses including large forming presses, cranes, and road building equipment are described in this 4-page bulletin. World Bestos, New Castle, Ind.

Taps, Dies, Gages

Catalog 24, 64 pages, lists general purpose taps, taps for special applications, pipe and bolt dies, pipe thread gages, and plug gages. Tables cover tap dimensions and limits, cutting speeds and lubricants, taps recommended for various classes of fits, and tap drill sizes. Winter Bros. Co., division of National Twist Drill & Tool Co., Rochester, Mich.

Precision Cylindrical Grinders

Machines with 14 and 18 in. swings and center lengths from 48 to 168 in. that can carry workpieces up to 6500 lb are described in this 16-page bulletin. Landis Tool Co., Waynesboro, Pa.

Cranes

This 4-page bulletin covers various types of overhead and jib cranes. A chart lists operating speeds of elec-

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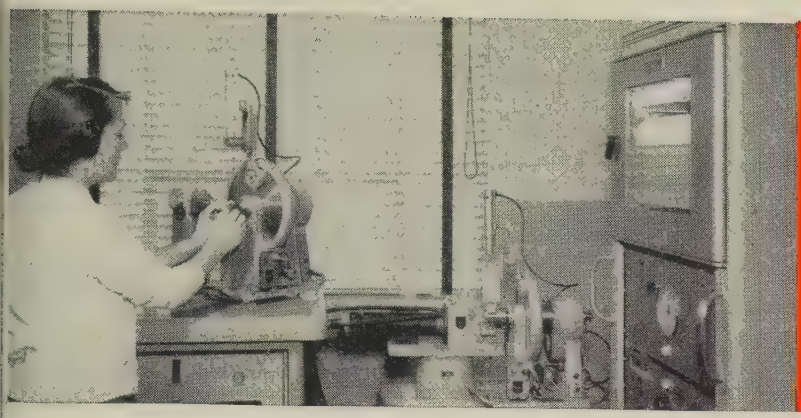

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NEW LITERATURE . . .

tric traveling cranes. All-State Engineering Co. Inc., 7050 N. 76th St., Milwaukee, Wis.

Collet Chucks

Bulletin 8B, 12 pages, describes uses of collets for toolroom lathes, engine lathes, and grinders. Hardinge Bros. Inc., Elmira, N. Y.

Framing System

Slotted angles for use in building shelves, racks, tables, and platforms are described in this 4-page bulletin. Acme Steel Co., 135th Street and Perry Avenue, Chicago 27, Ill.

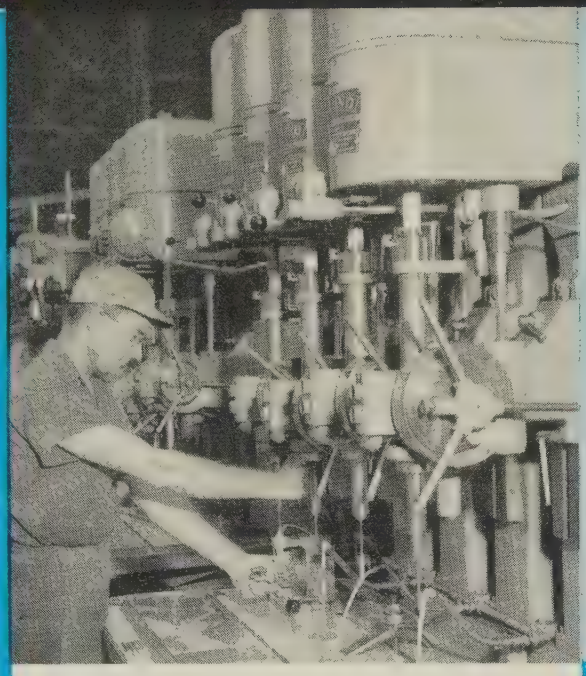
Sheets and Strip

Low carbon steels, high carbon steels, copper base alloys, stainless steels, and aluminum for shearing or slitting to required sizes are itemized in stock lists. Precision Steel Warehouse Inc., 3500 N. Wolf Rd., Franklin Park, Ill.

Aluminum Tanks

This 16-page bulletin covers design, fabrication, and uses of aluminum tanks and vessels. It lists over 100 general types of chemicals for which aluminum is advantageous. Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.

CATERPILLAR CHOOSES EDLUND



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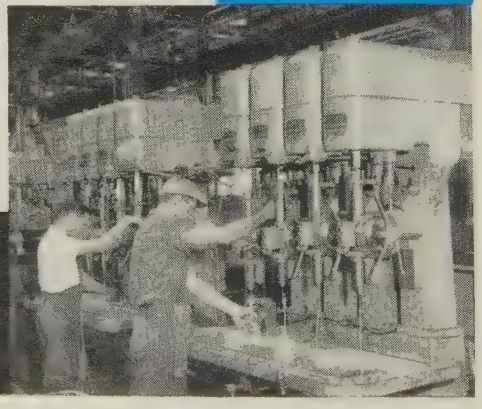

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Ways and Slides

Ways and gibs for machine tools and aluminum bronze slides for dies are described in this 16-page bulletin. Dept. AF-65, Ohio Knife Co., Cincinnati 23, Ohio.

Cutoff Machines

High speed machines for cutting off tubing, pipe, and bar stock; automatic loaders; hot spinning machines; and drill tables are described in this 12-page bulletin. Modern Machine Tool Co., Jackson, Mich.

Rolling Mill Couplings

Dihedral spindle couplings for roller drives are described and dimensioned in this 12-page bulletin, 64. Ajax Flexible Coupling Co. Inc., Westfield, N. Y.

NEW BOOKS

Welding Handbook, First Section Fourth Edition, American Welding Society, 33 W. 39th St., New York 18, N. Y. 560 pages, $9.

Fundamentals of welding are covered in this volume, which includes 420 illustrations and 86 tables. Chapters are devoted to standard welding terms and their definitions, engineering tables, welding metallurgy, properties of welded joints, thermal and mechanical treatment of weldments, design of welded joints, estimating costs, inspection, mechanical testing of welds, statistical control, and safe practices.

Handbook of Noise Control, Cyril M. Harris, McGraw-Hill Book Co. Inc., 327 W. 41st St., New York 36, N. Y. 1184 pages, $16.50.

Every aspect of unwanted sound is treated in this book. The nature of noise, its measurement, and techniques of its control in buildings, industry, transportation, and the community are discussed. Particular stress is given to the solution of noise problems by the use of examples taken from existing installations.

Recommended Practice for Repair Welding and Fabrication Welding of Steel Castings, Steel Founders' Society of America, 606 Terminal Tower, Cleveland 13, Ohio. 52 pages, 50 cents.

This manual covers welding methods, electrodes and welding procedures for carbon steel and low alloy castings. Each general alloy series is indexed. Included is a comprehensive listing of mild steel and low alloy electrodes.

Market Outlook

COMPETITION for steel business has become so keen that mills must answer a consumer's inquiry within an hour or run the risk of losing the order.

Steel is so plentiful that the customer doesn't have to wait to find a taker for his order. There's likely to be more than one salesman ready to grab it.

THE DRIVER'S SEAT—Some buyers are encouraged to demand quick delivery. They see no need to carry large inventories. They're ordering only what they need for immediate use, and they must have it promptly, lest their production schedules be interrupted.

Over-all demand for steel is not pressing. Consumption is off, and many users are still working off inventories.

OUTPUT DECLINES—The lethargy in buying is reflected in the steel industry's ingot production rate. Except for holiday and strike-affected weeks, output (percentagewise and tonnagewise) hasn't been as low since the end of 1954, which was a slow year. In the week ended Nov. 17, production of steel for ingots and castings was down to 77.5 per cent of capacity. The rate yielded 1,983,600 net tons. The preceding week's rate was 79 per cent; the yield, 2,022,000 tons.

USAGE HOLDS UP—While steel consumption is down, it's not off as much as steel demand and production. Since last April, consumption has exceeded mill shipments of finished steel. Consumers have been living to some extent upon their inventories.

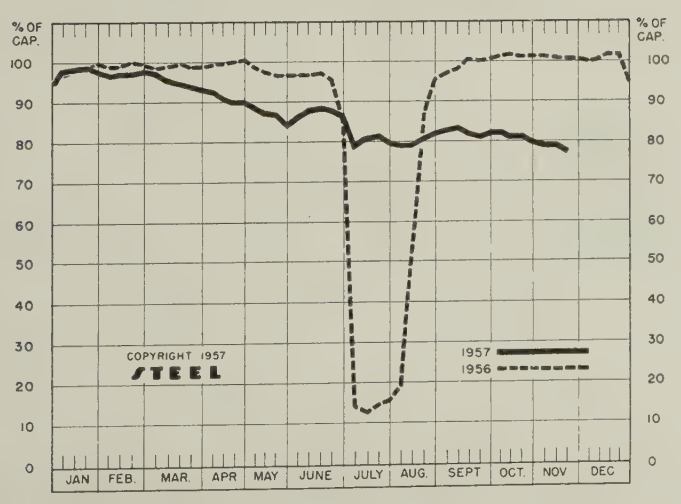
Demand is not uniform. In some cases, it is slightly softer than it was. In others, it is slightly stronger. Mills in the Chicago area have not booked as much tonnage for December as they did a month ago for November delivery. Copperweld Steel Co., Pittsburgh, reports a pickup in incoming orders. A Pittsburgh producer of cold-finished bars says sales rose in early November by 5 to 10 per cent. Shipyards are stepping up their requests for plates, and the Navy is calling for more.

LESS IRON NEEDED—The decline in steel production is pulling down pig iron output—the lower the steel output, the lower the amount of iron needed. Normally, the steelmaking rate is about the same as the blast furnace rate, but this year has been an exception. In the first nine months, the steelmaking rate averaged 87.9 per cent of capacity; the blast furnace rate averaged 95.1 per cent. Steelmakers were using high proportions of hot iron in their melts to avoid high prices of scrap.

SCRAP DOWN AGAIN—Heavy reliance on hot iron and the decline in steel production sent scrap prices into a drop that continued through the week ended Nov. 13. STEEL's scrap price composite was $33.17 a gross ton, off 16 cents from the week-ago figure.

LABOR COST TO RISE—While mills watch scrap prices go down, they foresee a rise in labor costs. Steelworkers automatically get pay boosts when the cost of living rises a stipulated amount. The cost of living is measured twice a year—May 15 and Nov. 15. The Nov. 15 level will be announced by the government late in December. It's expected that the rise will be sufficient to give the steelworkers a wage increase of 3 or 4 cents an hour on Jan. 1.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Nov. 17	Change	Same Week 1956	Same Week 1955
Pittsburgh	84	+ 2.5	97	102
Chicago	80.5	+ 0.5	100	99
Mid-Atlantic	83	0	102	98
Youngstown	66	0	104	100
Wheeling	69	— 2	101.5	100
Cleveland	80	— 4.5*	102.5	100
Buffalo	85.5	— 4.5	107.5	105
Birmingham	60.5	— 6.5	95.5	94.5
New England	53	+ 3	87	90
Cincinnati	83.5	+ 3.5*	96.5	92.5
St. Louis	91	0	106	90.5
Detroit	95.5	+ 1*	100	98
Western	86	— 5	109	99
National Rate	77.5	— 1.5	100.5	99

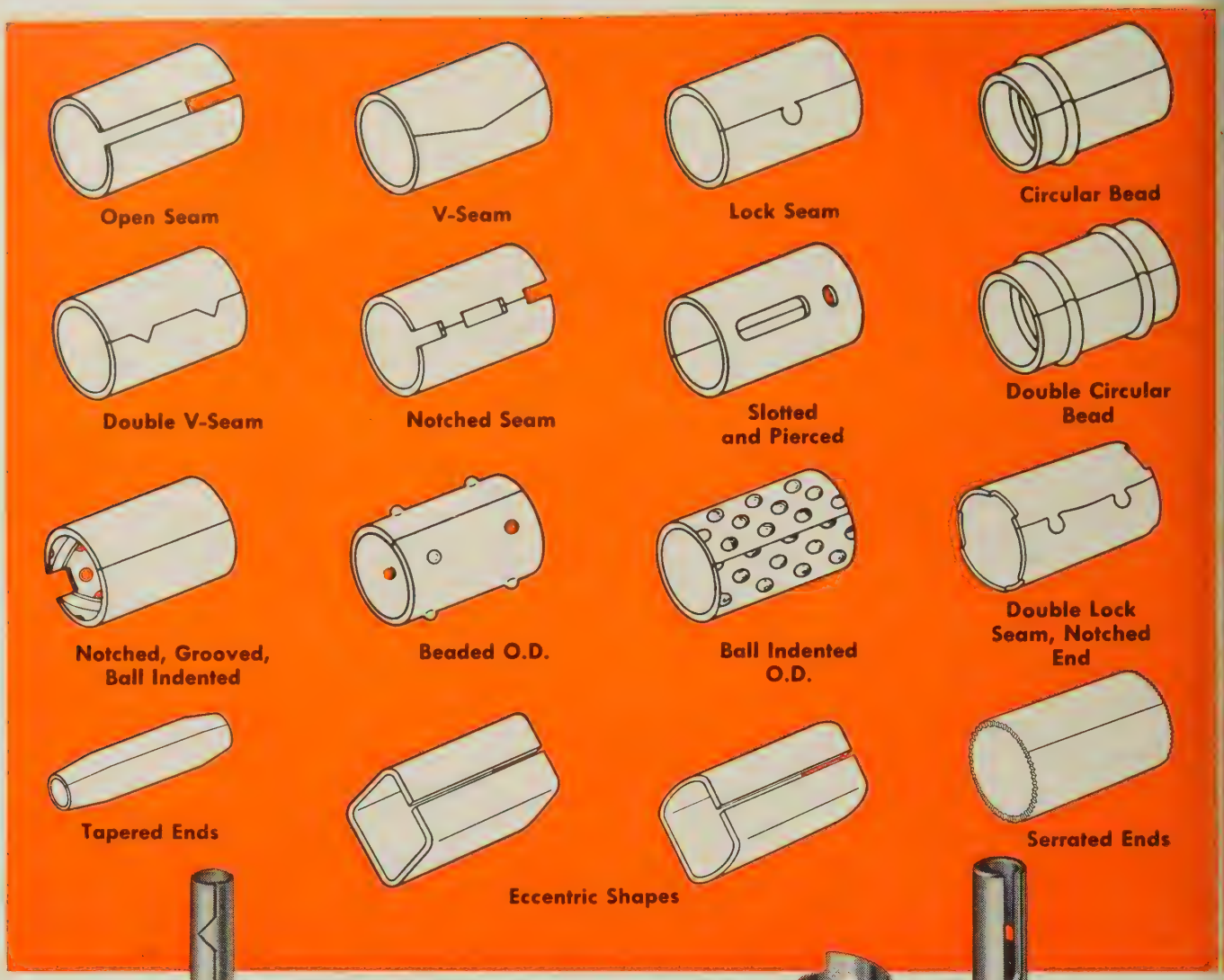
INGOT PRODUCTION‡

	Week Ended Nov. 17	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	123.5†	124.3	128.9	153.5
NET TONS (In thousands)	1,984†	1,996	2,070	2,466

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—Page 103

Technical Outlook—Page 151



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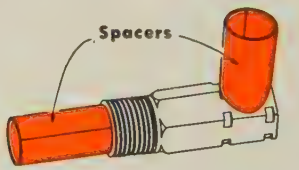

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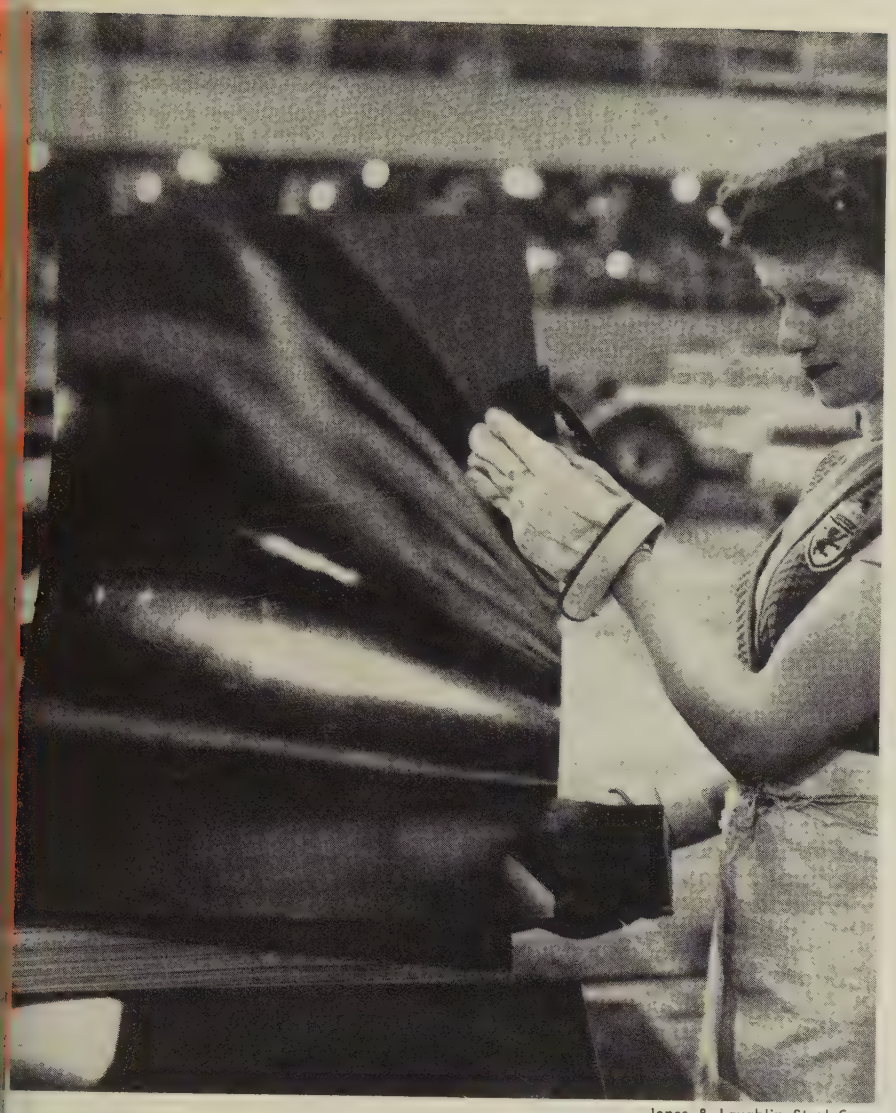


Jones & Laughlin Steel Corp.

oth quality and pricing of tin plate get close attention

Tin Mill Prices To Hold

New policy on pricing will take effect Jan. 1, but stability s foreseen until at least the next automatic increase in labor costs, scheduled for July, 1958

TIN PLATE users can look for price stability in the first half f 1958, despite a change in pric- ng policy by leading producers.

Beginning Jan. 1, 1958, U. S. teel Corp., Pittsburgh, will an- ounce price revisions not less han 35 days prior to their effec- ive date. Formerly, producers nnounced prices in spring and all for subsequent six-month pe- iods.

No Early Change — Although U. S. Steel and other leading producers have not revealed price plans, it's a fair assumption that base prices will be steady through the first half of 1958.

By moving pricing methods for tin mill products into closer alignment with those for other steel products, U. S. Steel stresses the growing importance of labor costs in the over-all expense of producing tin plate. As a major producer points out: "The amount of tin used in each base box continually declines. In comparison with practice 15 years ago, we're using only half as many pounds of tin in each ton of tin plate because of improvements in the electrolytic process. Say we use ¼ lb of tin in an $8.75 base box of electrolytic tin plate. If tin costs $1 per pound, we use only 25 cents worth in the $8.75 product. Climbing labor costs hike the price of producing tin plate."

Used To Be Guesswork—Under the new pricing structure of U. S. Steel, prices can be increased, if necessary, at the time of new labor contracts. In previous years, steelmakers had to guess in April how much their labor costs would rise in July. If they were too low, they would have to hike prices again in October. Customer relations suffered.

Business Climate—Tin plate producers and customers say that the first quarter of 1958 would be a poor time to raise prices. The last increase, on Apr. 30, brought a chorus of angry cries from consumers. Market conditions are expected to be dull through first quarter of next year, creating a poor climate for a price boost. Any increase in steel would tend to eliminate the advantage of lower cost which that metal holds over aluminum. It's probable that U. S. Steel will hold its present price level until another increase in labor costs (July, 1958) makes an adjustment necessary. Even then the corporation will think twice before making a move if demand is slack.

Stronger Market Ahead — Tin plate sellers don't look for the slow market to extend beyond the first quarter of next year. Sales are off seasonally. Customers' stocks are unusually high because of poor crops in several areas. So inventory reduction programs are in progress.

Sales dips don't add up to long term trouble for steelmakers, say tin plate sales managers. As a U. S. Steel sales manager reports: "Based on all our advance sales reports, we expect a substantial increase in tin mill sales early next year."

Other producers told STEEL they agree with the forecast. New applications will help them realize

1958 goals. Soft drink manufacturers used an estimated 315 million cans in 1956. Steelmakers expect greater usage when they solve all problems of canning carbonated soft drinks.

They'll Take More—Market observers predict that more fruit juice and nonfood products, such as shaving cream, will be canned. Among the "possibles" are instant coffee and fresh milk. The use of beer cans continues its steady growth.

Producers of aluminum and glass are moving into the market. Aluminum has a foot in the door. Tin plate producers don't view the metal as a competitor—yet. One steel sales manager says: "Aluminum will not affect use of tin plate within the next five years. Aluminum in cans is obviously experimental now."

Gen. Lucius D. Clay, chairman of Continental Can Co., New York, emphasized that his company does not consider aluminum as a substitute for tin plate but a material which can give metal containers greater versatility and usefulness.

Tinless Can—Research to find a substitute for tin also fails to frighten tin plate sellers. One explains: "All efforts to use chemically treated steel instead of tin have failed. A few products, such as detergents and motor oil, can be packaged in black plate. Even if the bulk of products could be canned in black plate, we wouldn't worry."

He speaks for the industry when he adds: "We want to sell steel, regardless of how it's coated."

Wire . . .

Wire Prices, Pages 253 & 254

Four thousand tons of carbon wire for spinning cables for the Throggs Neck suspension bridge between Bronx and Queens, N. Y., will be drawn at the Trenton, N. J., Works of the American Steel & Wire Div., U. S. Steel Corp. The rods will come from Donora, Pa., and Worcester, Mass.

Fastener makers and other large consumers in New England are paring inventories through December, but they are placing some first quarter delivery orders.

High carbon wire tonnage this year reflects a decline of 10 to 15 per cent in precision spring volume.

Steel Bars . . .

Bar Prices, Page 251

Sluggish demand for bars is unchanged. Consumers are ordering only what they need for work at hand, depending as far as possible on inventories to support manufacturing schedules. Forward buying is disappointing, particularly on automotive, appliance, and farm implement accounts.

Farm implement manufacturers have been cutting back on their operations; the move has been reflected in demand for steel products of various kinds, including bars. Auto buying is a little heavier than it was, but volume is far from expectations for this period. Some steel product producers say December tonnage will fall under that booked for November shipment.

Cold-finished bar demand is reported slightly improved at Pittsburgh, but the gain is scarcely noticeable. The remainder of the fourth quarter is expected to see continuance of demand on present

vels. Orders from most consumers are small, and they are widely attered. Automakers appear to e waiting until early 1958 before ntering the market for large tonage.

Inventories of alloy bars are low New England, and spot buying necessary in some cases, despite he policy of most consumers to eep stocks down for the yearend.

lates . . .

Plate Prices, Page 251

Wider and heavier plates are irtually the only steel products n short supply in the Pittsburgh istrict. Mills continue to allocate heir heavy, sheared plate production, but users are not meeting ith undue difficulty in obtaining ll the tonnage they require.

Warehouse stocks have improved, as have deliveries from ills outside the Pittsburgh area. Demand continues strong, over-all, ut sales of light gage plates are leclining steadily. The railroads nd builders on miscellaneous contruction work are taking smaller onnages.

Integrated plate mill fabricating shops are booking more bridge work direct. Two eastern Pennsylvania units have 4000 tons (plate girders) for New York State structures.

Weldment and other users of heavier gage plates in New England are ordering less tonnage. Their backlogs are smaller. Among larger users, shipyards are increasing specifications. Heavier direct buying by the Navy is noted, with more first quarter tonnage being placed.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 252 & 253

Sheetmakers are booking substantial orders from the automotive industry, but volume is nowhere near what had been expected. November shipments to autobuilders are about the same as October's.

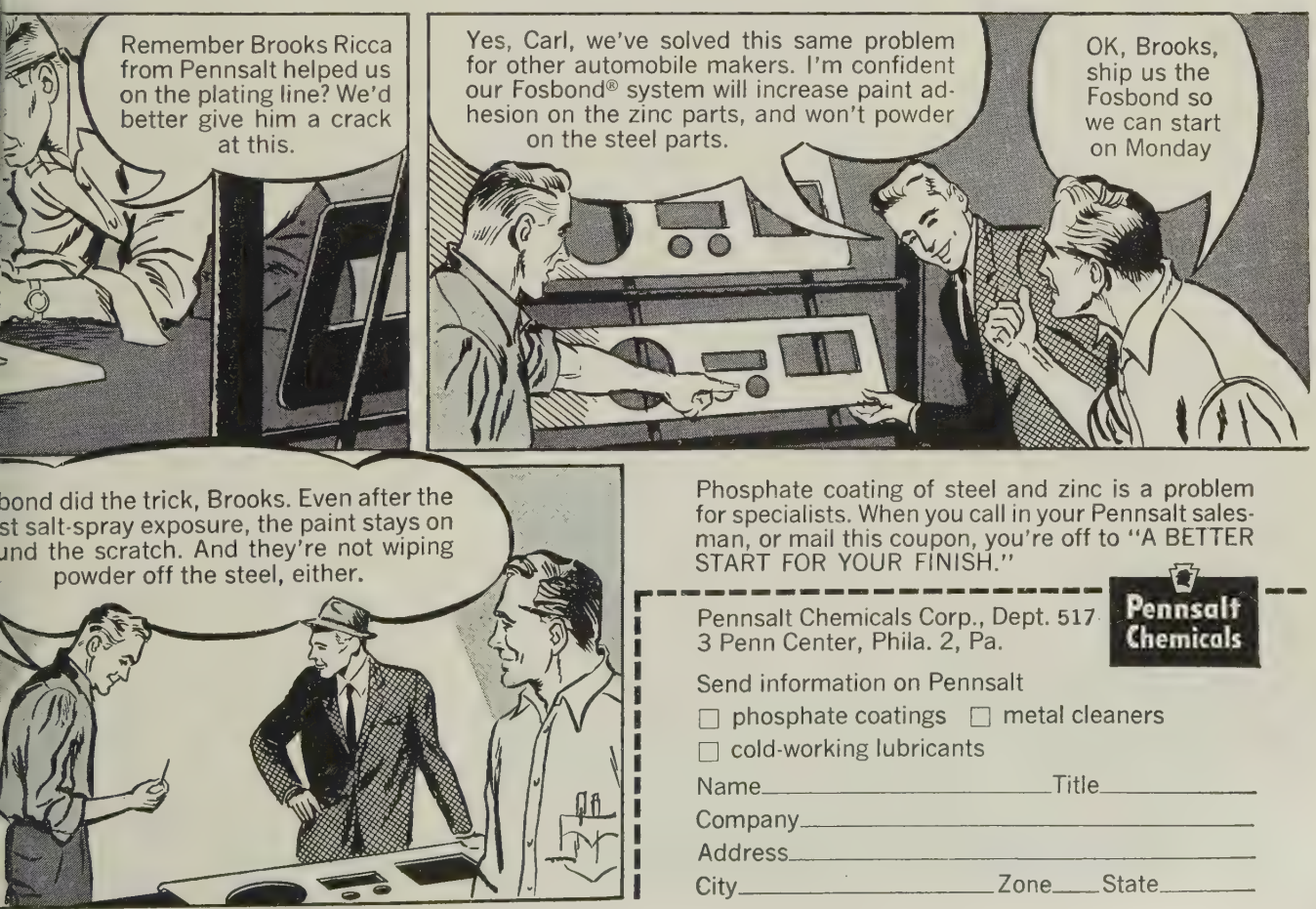
Automotive sheet inventories are low, ranging three weeks and less. Auto frame makers are placing business in about the same volume as they did a year ago; in some cases it may be slightly better than last year's tonnage. Manufacturers of parts have been booking orders the last two or three weeks, and they will be requiring steel shortly.

The appliance industry is not taking as much tonnage as it did a year ago, and demand from the farm implement makers continues disappointing.

Suppliers of hot and cold-rolled sheets at Pittsburgh see no prospect of a change in sales volume the remainder of this quarter. But they say the downswing which began in October has ended. Looking ahead, they report orders booked for December and January shipment are comparatively small. One major Pittsburgh mill thinks autobuilders' inventories have been pretty well depleted.

Buying in New England is behind the October pace. A decline in consumption of cold-rolled strip is stretching out inventory liquidation. Bookings through December are not likely to improve.

Slit sheets are making inroads into the market for cold-rolled strip. Most buying of the flat-rolled products is for prompt shipment.



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Tubular Goods . . .

Tubular Goods Prices, Page 255

Seamless tubular goods demand is declining, users apparently having decided to let their inventories drop to the lowest possible level. Mechanical and pressure tubing sales are slower than they were in October. Further weakening is likely in December.

Large diameter pipe is in fairly strong demand. Line pipe sales are good. Smaller diameter pipe is in weakest demand. Sales of oil country goods continue to slacken. Even the largest users are expected to be ordering hand-to-mouth in December. Suppliers will be expected to give quick shipments in first quarter.

Buttweld orders have bogged down in New England following a slight flurry of buying. Demand for seamless, 12 in. and under, also has slackened in the area with the utilities well stocked and deferring some tonnage. District distributors have well balanced inventories, and they are holding new orders to spot replacements. This includes mechanical and pressure tubing. Inquiry for pipe piling in the Boston area, notably for foundation work in a redevelopment program, is reported increasing.

Structural Shapes . . .

Structural Shape Prices, Page 251

Competition among structural fabricating shops is notably sharp on work requiring standard and bar shapes and composite beam bridges. Twelve fabricators bid on steel for a 700-ton bridge contract in New England recently. Several of the shops usually do a minimum of bridge work estimating.

While wide flange beams are still in tight supply, the situation is improving. Order backlogs involving bridges are less crowded than they were. School inquiry continues active, designs in many cases calling for bar tonnage as heavy as that for light structurals.

In New England, current industrial work includes a shop for Walworth Co., Braintree, Mass.

Encouraging to suppliers of steel for highway construction is the fact that competition for work by contractors is bringing lower bids. Apparent low bids early in

November for seven Cook County, Ill., expressway construction jobs, estimated to cost $6 million, are nearly $700,000 below engineers' estimates.

A downtrend in highway costs would be a stimulating influence to 1958 work. High costs have caused some jobs to be sidetracked this year.

The Columbia-Geneva Steel Div., U. S. Steel Corp., has closed down two of its ten open hearth furnaces and trimmed structural steel rolling mill operations from five to four days a week.

Rails, Cars . . .

Track Material Prices, Page 254

The Duluth Missabe & Iron Range Railway has placed a $6,750,000 order for 28 diesel locomotives to be delivered before the start of ore shipping next spring. Fred J. Voss, president of the U. S. Steel subsidiary, said 36 more diesel locomotives will be bought within the next two years. The locomotives were booked by the Electro-Motive Div., General Motors Corp., La Grange, Ill.

Warehouse . . .

Warehouse Prices, Page 256

Demand for steel from warehouses is following the same pattern as that from mills: Consumers are buying as requirements develop; they want fast delivery, and the volume of business is downward.

Sales managers in the Pittsburgh district believe their shipments have not fallen off as far as those of distributors who depend on a single industry, such as automotive, or a limited number of small industries. Some of the industrial construction firms in Pittsburgh have continued their steel buying at a high level, partially counteracting the effect of lighter demand from other customers.

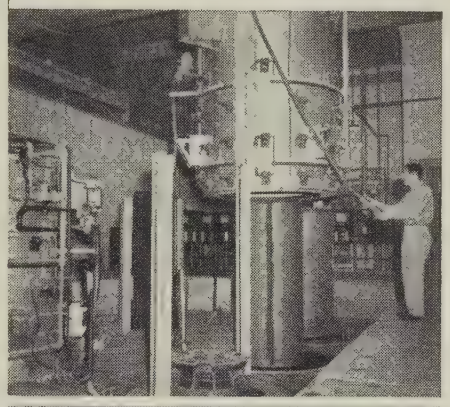
All products are in freer supply, including structural shapes and heavy plates, although a few shapes and sizes in those categories are still hard to obtain within the delivery time desired.

A general reduction in inventories is expected to continue at least through the early part of the first

Bright Annealing?
Normalizing?
Nitriding?
Spheroidizing?

You can't beat

CONTINENTAL TOP HAT



COVER-TYPE ANNEALER

Faster and More Uniform Heating Rate
Extra large volume of recirculating atmosphere.

Highest Production per Unit

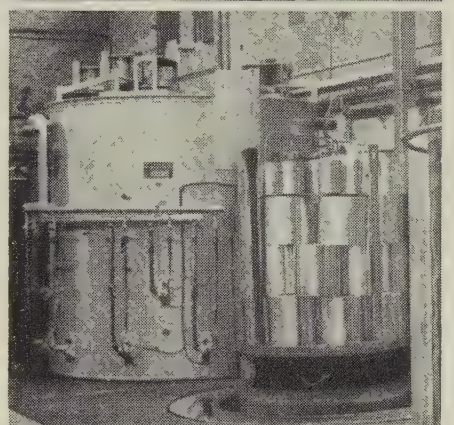
Versatility
Can be used for bright annealing, normalizing, nitriding, or spheroidizing coiled wire or strip—ferrous or nonferrous.

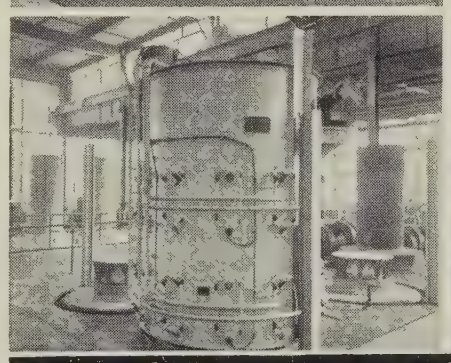
High Efficiency
No radiant tubes.

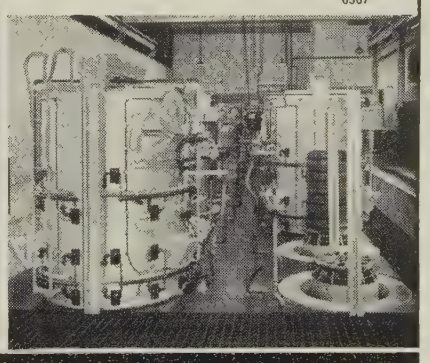
Long Hood Life
No flame impingement.

Full particulars and recommendation for any job on request.

6367



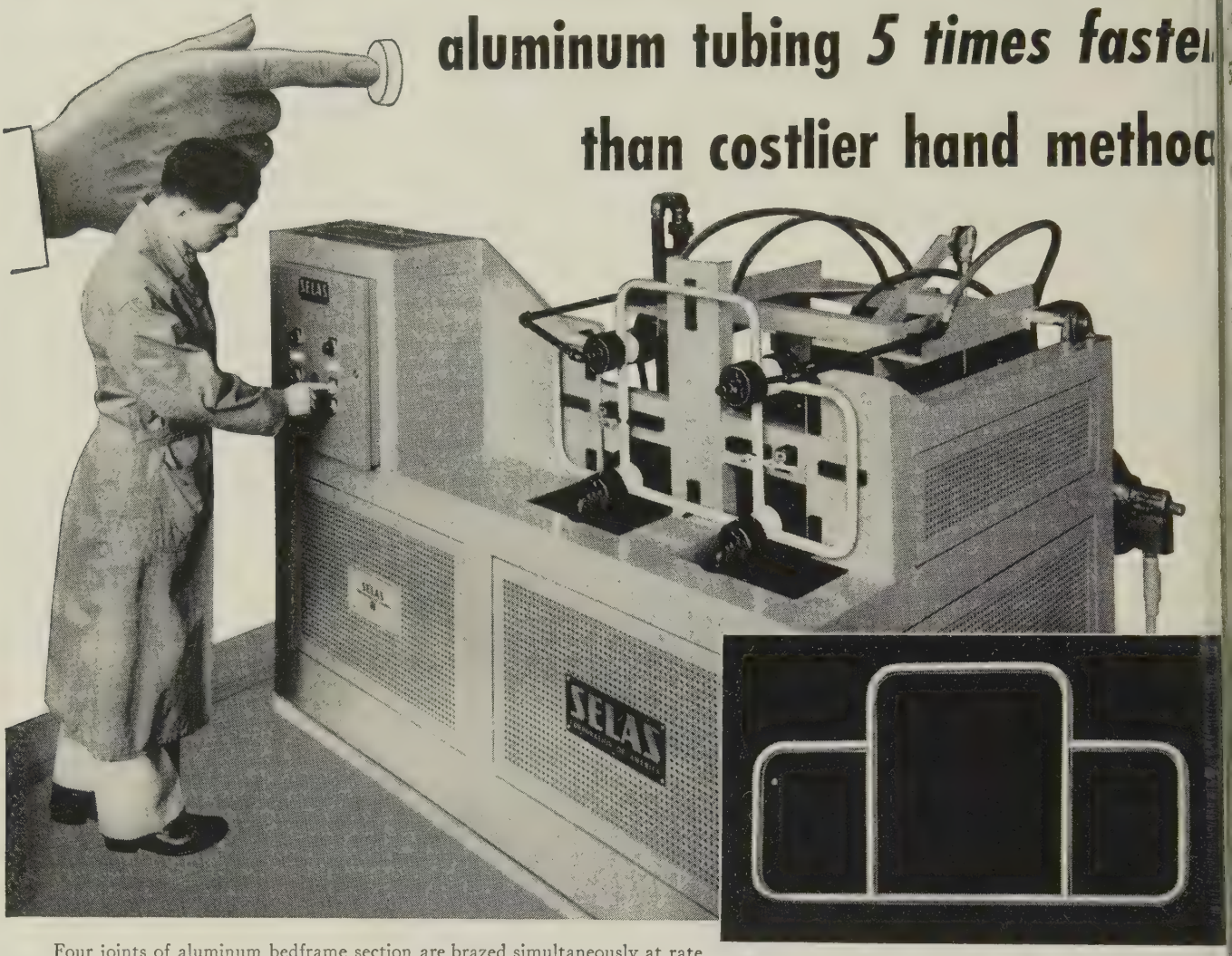




Over One-Third of a Century of Progress in
FURNACES · PRODUCTION LINES · SPECIAL MACHINES · COMPLETE PLANTS

CONTINENTAL INDUSTRIAL ENGINEERS, INC.
176 West Adams Street, Chicago 3, Illinois

PUSH the BUTTON... and this SELAS machine brazes aluminum tubing *5 times faster* than costlier hand method



Four joints of aluminum bedframe section are brazed simultaneously at rate of 25 complete assemblies per hour. Automatic cycle: burners move into position, high fire, low fire, standby for cooling, burners retract. Previous hand method, requiring high labor skill because of narrow temperature margin between workpiece and aluminum filler, turned out only 40 assemblies per day.

On pioneering projects . . . or in improving routine joining and assembling operations . . . Selas simulates your production conditions in the research laboratory and brazes the actual workpiece. Then, fully-automatic or semi-automatic brazing machines are custom-engineered, custom-built to meet your specific requirements.

You get speed, versatility, reproducible uniformity, because Selas *builds the skills* into your machine. And, because Selas designs, constructs, starts-up and services each machine, problems usually associated with divided responsibility are eliminated.

Send for Bulletin 212 "Production Brazing and Soldering," and reprints "Gas-fired Machine Brazing" and "Mechanical Heating puts Brazing on the Production Line."

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
DEVELOPMENT • DESIGN • CONSTRUCTION

quarter, believe several leading distributors.

Soft galvanized sheet prices at the secondary level in New England are slowing the selling efforts of some distributors in that area: They are unable to meet lower prices at the normal markup.

Semifinished Steel . . .

Semifinished Prices, Page 251

Raw steel production in the Far West may reach 7 million tons this year, a record for the district. California will account for more than 3 million tons alone.

The estimates were made by Max D. Howell, executive vice president, American Iron & Steel Institute, during a regional technical meeting of the institute in San Francisco last week.

Kaiser Steel Corp.'s current expansion program is designed to increase ingot capacity from 1,536,000 tons to 2,933,000 tons annually at its Fontana, Calif., plant.

Iron Ore . . .

Iron Ore Prices, Page 258

Shipments of Lake Superior iron ore in the week ended Nov. 11 totaled 1,425,577 gross tons, reports the American Iron Ore Association. In the like week last year, the total was 2,607,217 tons.

Cumulative shipments this year to Nov. 11 were 82,809,870 gross tons, against 71,130,426 in the like period last year, an increase of 11,679,444 tons.

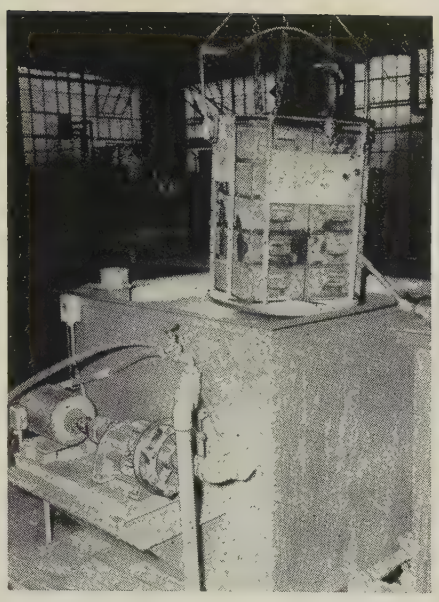
Anaconda Co. (Canada) Ltd., subsidiary of the Anaconda Co., has purchased a mining strip 40 miles north of Nakina in northwestern Ontario. Drilling and other tests indicate a large body of magnetic ore, which can be processed into 64 to 68 per cent iron concentrate, it is reported.

Pig Iron . . .

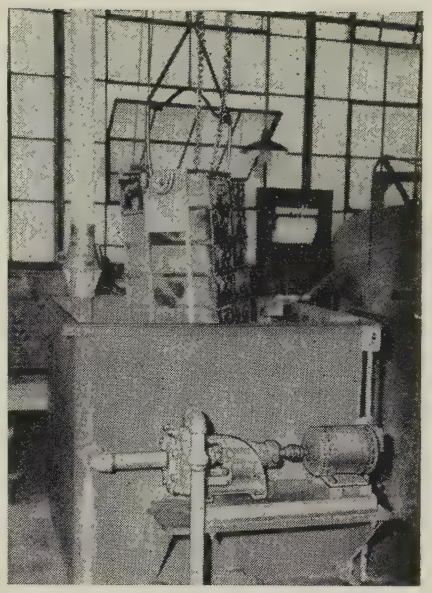
Pig Iron Prices, Page 256

The foundry melt at gray iron and malleable shops is about 25 per cent below what it was a year ago, and pig iron shipments from furnaces are correspondingly lower. Most gray iron and malleable shops are operating on a three or four day schedule. The

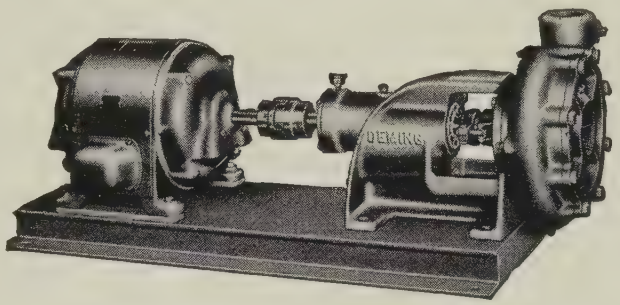
(*Please turn to Page* 261)



Deming Fig. 4011 Centrifugal Pump delivers 180° caustic solution at rate of 100 g.p.m. against 46-foot head for degreasing trays of hand tools.



Same load of hand tools is rinsed in wash water tank served by another Deming Fig. 4011 Centrifugal Pump at 100 g.p.m. against 46-foot head.



What's *Your* job for this Versatile Deming Pump?

Champion de Arment Tool Company, Meadville, Pa., has a dual job for two identical Deming Fig. 4011 End Suction Centrifugal Pumps. "CHANNELLOCK" pliers and other famous hand tools are manufactured by that company.

Degreasing and rinsing trays of these tools is the dual job serviced by the Deming Pumps, as illustrated in the above views. *What's YOUR job for this versatile Deming Pump?*

Optional features of Fig. 4011 make it readily and *economically* adaptable for handling a wide variety of liquids, including many corrosive materials.

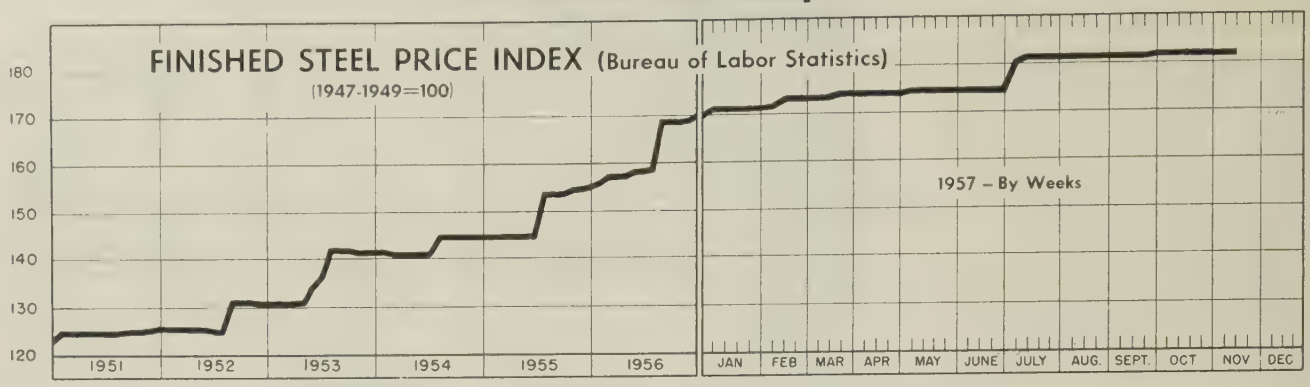
Bulletin No. 4011-B gives all the facts. Ask for your free copy.

THE DEMING COMPANY • 535 BROADWAY, SALEM, OHIO

DEMING

INDUSTRIAL PUMPS

Price Indexes and Composites



Nov. 12, 1957	Week Ago	Month Ago	Oct. Avg.	Year Ago
181.7	181.7	181.7	181.7	168.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 12

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.600	Bars, Reinforcing	6.210
Rails, Light, 40 lb	7.067	Bars, C.F., Carbon	10.360
Tie Plates	6.600	Bars, C.F., Alloy	13.875
Axles, Railway	9.825	Bars, C.F., Stainless, 302 (lb)	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.000	Sheets, H.R., Carbon	6.192
Plates, Carbon	6.150	Sheets, C.R., Carbon	7.089
Structural Shapes	5.942	Sheets, Galvanized	8.220
Bars, Tool Steel, Carbon (lb)	0.535	Sheets, C.R., Stainless, 302 (lb)	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650	Sheets, Electrical	12.025
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V2.1, Mo 5.5, C 0.60 (lb)	1.355	Strip, C.R., Carbon	9.243
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.850	Strip, C.R., Stainless, 430 (lb)	0.493
Bars, H.R., Alloy	10.525	Strip, H.R., Carbon	6.245
Bars, H.R., Stainless, 303 (lb)	0.525	Pipe, Black, Buttweld (100 ft)	19.814
Bars, H.R., Carbon	6.425	Pipe, Galv., Buttweld (100 ft)	23.264
		Pipe, Line (100 ft)	199.023
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
		Tubes, Boiler (100 ft)	49.130
		Tubing, Mechanical, Carbon (100 ft)	24.953
		Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483
		Black Plate, Canmaking Quality (95 lb base box)	7.583
		Wire, Drawn, Carbon	10.225
		Wire, Drawn, Stainless, 430 (lb)	0.653
		Bale Ties (bundles)	7.967
		Nails, Wire, 8d Common	9.88
		Wire, Barbed (80-rod spool)	8.729
		Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Nov. 13 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	225.92	181.31
Index in cents per lb	6.479	6.479	6.479	6.111	4.912

STEEL's ARITHMETICAL PRICE COMPOSITES*

	Nov. 13 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Finished Steel, NT	$146.03	$146.03	$146.03	$137.66	$110.88
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	62.63	55.644
Basic Pig Iron, GT	65.99	65.99	65.99	62.18	54.666
Malleable Pig Iron, GT	67.27	67.27	67.27	63.41	55.77
Steelmaking Scrap, GT	33.17	33.33	37.83	61.50	43.000

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 13 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld., Philadelphia	5.725	5.725	5.725	5.35	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.40	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.10	5.50	5.25	4.35
Plates, Sparrows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.70	5.70	5.70	5.35	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsburgh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.75-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.10-5.225
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.20	6.20-6.35
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.85	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, 7/32-5/8" Pitts.	6.15	6.15	6.15	5.80	4.325

PIG IRON, Gross Ton	Nov. 13 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$63.50	$55.50
Basic, Valley	66.00	66.00	66.00	62.50	54.50
Basic, deld., Phila.	70.01	70.01	70.01	66.26	59.25
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, deld., Phila.	70.51	70.51	70.51	66.76	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry (Birm.) deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	63.00	55.00
Malleable, Chicago	66.50	66.50	66.50	63.00	55.00
Ferromanganese, Duquesne.	245.00†	245.00†	245.00†	235.00†	228.00**

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$32.50	$31.50	$38.50	$62.10	$44.00
No. 1 Heavy Melt, E. Pa.	34.50	35.50	37.50	59.00	41.50
No. 1 Heavy Melt, Chicago	32.50	33.00	37.50	63.00	42.50
No. 1 Heavy Melt, Valley	31.50	32.50	36.50	66.50	44.00
No. 1 Heavy Melt, Cleve.	28.50	29.50	34.50	65.00	43.00
No. 1 Heavy Melt, Buffalo	32.50	32.50	38.50	59.50	43.00
Rails, Rerolling, Chicago	46.50	48.50	55.50	87.50	52.50
No. 1 Cast, Chicago	35.50	35.50	38.50	50.50	50.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$14.50	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	17.50	17.00

Steel Prices

Mill prices as reported to STEEL, Nov. 13, cents per pound except as otherwised noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 252; to footnotes, page 254.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$73.50

INGOTS, Alloy (NT)
Detroit S41 .....$77.00
Farrell, Pa. S3 .....77.00
Lowellville,O. S3 .....77.00
Midland,Pa. C18 .....77.00
Munhall,Pa. U5 .....77.00
Sharon,Pa. S3 .....77.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 .....$77.50
Bridgeport,Conn. N19 ..80.50
Buffalo R2 .....77.50
Clairton,Pa. U5 .....77.50
Ensley,Ala. T2 .....77.50
Fairfield,Ala. T2 .....77.50
Fontana,Calif. K1 .....88.00
Gary,Ind. U5 .....77.50
Johnstown,Pa. B2 .....77.50
Lackawanna,N.Y. B2...77.50
Munhall,Pa. U5 .....77.50
S.Chicago,Ill. R2, U5..77.50
S.Duquesne,Pa. U5 ....77.50
Sterling,Ill. N15 .....77.50
Youngstown R2 .....77.50

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$96.00
Bridgeport,Conn. N19..101.00
Buffalo R2 .....96.00
Canton,O. R2 .....98.50
Clairton,Pa. U5 .....96.00
Conshohocken,Pa. A3.101.00
Ensley,Ala. T2 .....96.00
Fairfield,Ala. T2 .....96.00
Fontana,Calif. K1 ...105.50
Gary,Ind. U5 .....96.00
Geneva,Utah C11 .....96.00
Houston S5 .....101.00
Johnstown,Pa. B2 ....96.00
Lackawanna,N.Y. B2...96.00
LosAngeles B3 .....105.50
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
Seattle B3 .....109.50
Sharon,Pa. S3 .....96.00
S.Chicago R2,U5,W14..96.00
S.Duquesne,Pa. U5 ...96.00
S.SanFrancisco B3 ...105.50
Warren,O. C17 .....96.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$114.00
Bridgeport,Conn. N19.114.00
Buffalo R2 .....114.00
Canton,O. R2, T7 ....114.00
Conshohocken,Pa. A3..121.00
Detroit S41 .....114.00
Economy,Pa. B14 ....114.00
Farrell,Pa. S3 .....114.00
Fontana,Calif. K1 ....135.00
Gary,Ind. U5 .....114.00
Houston S5 .....119.00
Ind.Harbor, Ind. Y1 ..114.00
Johnstown,Pa. B2 ...114.00
Lackawanna,N.Y. B2.114.00
Los Angeles B3 .....134.00
Lowellville,O. S3 ....114.00
Massillon,O. R2 ....114.00
Midland,Pa. C18 .....114.00
Munhall,Pa. U5 .....114.00
Sharon,Pa. S3 .....114.00
S.Chicago R2,U5,W14.114.00
S.Duquesne,Pa. U5 ...114.00
Struthers,O. Y1 .....114.00
Warren,O. C17 .....114.00

ROUNDS, SEAMLESS TUBE (NT)
Bridgeport,Conn. N19 $122.50
Buffalo R2 .....117.50
Canton,O. R2 .....120.00
Cleveland,O. R2 .....117.50
Gary,Ind. U5 .....117.50
S.Chicago,Ill. R2, W14 117.50
S.Duquesne,Pa. U5 ...117.50
Warren,O. C17 .....117.50

SKELP
Aliquippa,Pa. J5 .....5.075
Munhall,Pa. U5 .....4.875
Warren,O. R2 .....4.875
Youngstown R2, U5 ..4.875

WIRE RODS
AlabamaCity,Ala. R2 ..6.15
Aliquippa,Pa. J5 .....6.15
Alton,Ill. L1 .....6.35
Buffalo W12 .....6.15
Cleveland A7 .....6.15
Donora,Pa. A7 .....6.15
Fairfield,Ala. T2 .....6.15
Houston S5 .....6.40
IndianaHarbor,Ind. Y1..6.15
Johnstown,Pa. B2 .....6.15
Joliet,Ill. A7 .....6.15
KansasCity,Mo. S5 ....6.40
Kokomo,Ind. C16 .....6.25
LosAngeles B3 .....6.95
Minnequa,Colo. C10 ....6.40
Monessen,Pa. P17 .....6.15
N.Tonawanda,N.Y. B11.6.15
Pittsburg,Calif. C11 ....6.95
Portsmouth,O. P12 ....6.15
Roebling,N.J. R5 .....6.25
S.Chicago,Ill. R2 .....6.15
SparrowsPoint,Md. B2 ..6.25
Sterling,Ill. (1) N15 ....6.15
Sterling,Ill. N15 .....6.25
Struthers,O. Y1 .....6.15
Worcester,Mass. A7 ....6.45

STRUCTURALS

Carbon Steel Std. Shapes
Ala.City,Ala. R2 ....5.275
Atlanta A11 .....5.475
Aliquippa,Pa. J5 .....5.275
Bessemer,Ala. T2 .....5.275
Bethlehem,Pa. B2 ....5.325
Birmingham C15 .....5.275
Clairton,Pa. U5 .....5.275
Fairfield,Ala. T2 .....5.275
Fontana,Calif. K1 ....6.075
Gary,Ind. U5 .....5.275
Geneva,Utah C11 .....5.275
Houston S5 .....5.375
Ind.Harbor,Ind. I-2 ...5.275
Johnstown,Pa. B2 ....5.325
Joliet,Ill. P22 .....5.275
KansasCity,Mo. S5 ....5.375
Lackawanna,N.Y. B2..5.325
LosAngeles B3 .....5.975
Minnequa,Colo. C10 ...5.575
Munhall,Pa. U5 .....5.275
Niles,Calif. P1 .....5.925
Phoenixville,Pa. P4 ...5.325
Portland,Oreg. O4 ....6.025
Seattle B3 .....6.025
S.Chicago,Ill. U5, W14.5.275
S.SanFrancisco B3 ....5.925
Sterling,Ill. N15 .....5.275
Torrance,Calif. C11 ..5.975
Weirton,W.Va. W6 ....5.275

Wide Flange
Bethlehem,Pa. B2 ....5.325
Clairton,Pa. U5 .....5.275
Fontana,Calif. K1 ....6.225
IndianaHarbor,Ind. I-2.5.275
Lackawanna,N.Y. B2 ..5.325
Munhall,Pa. U5 .....5.275
Phoenixville,Pa. P4 ...5.325
S.Chicago,Ill. U5 .....5.275

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.55
Clairton,Pa. U5 .....6.55
Gary,Ind. U5 .....6.55
Houston S5 .....6.65
KansasCity, Mo. S5 ....6.65
Munhall,Pa. U5 .....6.55
S.Chicago,Ill. U5 .....6.55

H.S., L.A. Std. Shapes
Aliquippa,Pa. J5 .....7.75
Bessemer,Ala. T2 .....7.75
Bethlehem,Pa. B2 .....7.80
Clairton,Pa. U5 .....7.75
Fairfield,Ala. T2 .....7.75
Fontana,Calif. K1 .....8.55
Gary,Ind. U5 .....7.75
Geneva,Utah C11 .....7.75
Houston S5 .....7.85
Ind.Harbor,Ind. I-2, Y1 7.75
Johnstown,Pa. B2 .....7.80
KansasCity,Mo. S5 ....7.85
Lackawanna,N.Y. B2 ..7.80
LosAngeles B3 .....8.45
Munhall,Pa. U5 .....7.75
Seattle B3 .....8.50
S.Chicago,Ill. U5, W14..7.75
S.SanFrancisco B3 ....8.40
Struthers,O. Y1 .....7.75

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....7.80
Lackawanna,N.Y. B2 ..7.80
Munhall,Pa. U5 .....7.75
S.Chicago,Ill. U5 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.325
Lackawanna,N.Y. B2..5.325
Munhall,Pa. U5 .....5.275
S.Chicago,Ill. U5 .....5.275

STEEL SHEET PILING
Lackawanna,N.Y. B2 ..6.225
Munhall,Pa. U5 .....6.225
S.Chicago,Ill. U5 .....6.225

PLATES

PLATES, Carbon Steel
Ala.City, Ala. R2 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky. (15) A10..5.10
Bessemer,Ala. T2 .....5.10
Clairton,Pa. U5 .....5.10
Claymont,Del. C22 .....5.10
Cleveland J5, R2 .....5.20
Coatesville,Pa. L7 ....5.10
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.20
Fairfield,Ala. T2 .....5.10
Fontana,Calif.(30) K1 ..5.90
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.10
GraniteCity,Ill. G4 ....5.30
Harrisburg,Pa. P4 ....5.80
Houston S5 .....5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown, Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
LoneStar,Tex. L6 .....5.45
Mansfield,O. E6 .....5.10
Minnequa,Colo. C10 ....5.95
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Pittsburgh J5 .....5.10
Riverdale,Ill. A1 .....5.10
Seattle B3 .....6.00
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 5.10
SparrowsPoint,Md. B2 ..5.10
Sterling,Ill. N15 .....5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Youngstown R2, U5, Y1.5.10

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .....6.75
Fontana,Calif. K1 .....7.55
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Johnstown,Pa. B2 .....6.75
SparrowsPoint,Md. B2 ..6.75

PLATES, Wrought Iron
Economy,Pa. B14 .....13.15

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.625
Bessemer,Ala. T2 .....7.625
Clairton,Pa. U5 .....7.625
Claymont,Del. C22 ....7.625
Cleveland J5, R2 .....7.625
Coatesville,Pa. L7 ....7.925
Conshohocken,Pa. A3 ..7.625
Economy,Pa. B14 ....7.625
Ecorse,Mich. G5 ....7.725
Fairfield,Ala. T2 ....7.625
Farrell,Pa. S3 .....7.625
Fontana,Calif.(30) K1 .8.425
Gary,Ind. U5 .....7.625
Geneva,Utah C11 .....7.625
Houston S5 .....7.725
Ind.Harbor,Ind. I-2, Y1 7.625
Johnstown,Pa. B2 .....7.625
Munhall,Pa. U5 .....7.625
Pittsburgh J5 .....7.625
Seattle B3 .....8.525
Sharon,Pa. S3 .....7.625
S.Chicago,Ill. U5, W14 7.625
SparrowsPoint,Md. B2..7.625
Warren,O. R2 .....7.625
Youngstown U5 .....7.625

PLATES, ALLOY
Aliquippa,Pa. J5 .....7.20
Claymont,Del. C22 .....7.20
Coatesville,Pa. L7 ....7.20
Economy,Pa. B14 .....7.20
Farrell,Pa. S3 .....7.20
Fontana,Calif.(30) K1 ..8.00
Gary,Ind. U5 .....7.20
Houston S5 .....7.30
Ind.Harbor,Ind. Y1 ....7.20
Johnstown,Pa. B2 .....7.20
Lowellville,O. S3 ....7.20
Munhall,Pa. U5 .....7.20
Newport,Ky. A2 .....7.20
Pittsburgh J5 .....7.20
Seattle B3 .....8.10
Sharon,Pa. S3 .....7.20
S.Chicago,Ill. U5, W14..7.20
SparrowsPoint,Md. B2 ..7.20
Youngstown Y1 .....7.20

FLOOR PLATES
Cleveland J5 .....6.175
Conshohocken,Pa. A3 ..6.175
Ind.Harbor,Ind. I-2 ...6.175
Munhall,Pa. U5 .....6.175
S.Chicago,Ill. U5 .....6.175

PLATES, Ingot Iron
Ashland c.l. (15) A10..5.35
Ashland l.c.l. (15) A10..5.85
Cleveland c.l. R2 .....5.85
Warren,O. c.l. R2 .....5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.425
Aliquippa,Pa.(9) J5 ...5.425
Alton,Ill. L1 .....5.625
Atlanta(9) A11 .....5.625
Bessemer,Ala.(9) T2 ..5.425
Birmingham(9) C15 ..5.425
Bridgeport,Conn.(9) N19 5.65
Buffalo(9) R2 .....5.425
Clairton,Pa. (9) U5 ....5.425
Cleveland(9) R2 .....5.425
Ecorse,Mich.(9) G5....5.525
Emeryville,Calif. J7 ..6.175
Fairfield,Ala(9) T2 ..5.425
Fairless,Pa. (9) U5 ..5.575
Fontana,Calif.(9) K1 ..6.125
Gary,Ind.(9) U5 .....5.425
Houston (9) S5 .....5.675
Ind.Harbor(9) I-2, Y1 5.425
Johnstown,Pa.(9) B2 ..5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ...5.425
LosAngeles(9) B3 ....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 .....6.125
N.T'wanda,N.Y.(46)B11 5.775
Pittsburg,Calif.(9) C11.6.125
Pittsburgh(9) J5 .....5.425
Portland,Oreg. O4 .....6.175
Seattle B3, N14 .....6.175
S.Ch'c'go(9)R2,U5,W14 5.425
S.Duquesne,Pa.(9) U5..5.425
S.SanFran.,Calif.(9)B3 6.175
Sterling,Ill.(1)(9) N15..5.425
Sterling,Ill.(9) N15 ....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..5.425
Torrance,Calif.(9) C11.6.125
Youngstown(9) R2, U5.5.425

BARS, H.R. Leaded Alloy (Including leaded extra)
Warren,O. C17 .....7.475

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.475
Bethlehem,Pa. B2 .....6.475
Bridgeport,Conn. N19 ..6.55
Buffalo R2 .....6.475
Canton,O. R2, T7 ....6.475
Clairton,Pa. U5 .....6.475
Detroit S41 .....6.475
Economy,Pa. B14 ....6.475
Ecorse,Mich. G5 ....6.575
Fairless,Pa. U5 .....6.625
Farrell,Pa. S3 .....6.475
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 .....6.475
Houston S5 .....6.725
Ind.Harbor,Ind. I-2, Y1 6.475
Johnstown,Pa. B2 ....6.475
KansasCity,Mo. S5 ....6.725
Lackawanna,N.Y. B2 ..6.475
Lowellville,O. S3 ....6.475
LosAngeles B3 .....7.525
Massillon,O. R2 .....6.475
Midland,Pa. C18 .....6.475
Pittsburgh J5 .....6.475
Sharon,Pa. S3 .....6.475
S.Chicago R2, U5, W14 6.475
S.Duquesne,Pa. U5 ....6.475
Struthers,O. Y1 .....6.475
Warren,O. C17 .....6.475
Youngstown U5 .....6.475

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....7.925
Bessemer,Ala. T2 .....7.925
Bethlehem,Pa. B2 .....7.925
Bridgeport,Conn. N19 ..7.95
Clairton,Pa. U5 .....7.925
Cleveland R2 .....7.925
Ecorse,Mich. G5 .....8.025
Fairfield,Ala. T2 .....7.925
Fontana,Calif. K1 ....8.625
Gary,Ind. U5 .....7.925
Houston S5 .....8.175
Ind.Harbor,Ind. Y1 ....7.925
Johnstown,Pa. B2 .....7.925
KansasCity,Mo. S5 ....8.175
Lackawanna,N.Y. B2..7.925
LosAngeles B3 .....8.625
Pittsburgh J5 .....7.925
Seattle B3 .....8.675
S.Chicago,Ill. U5, W14 7.925
S.Duquesne,Pa. U5 ....7.925
S.San Francisco B3 ...8.675
Struthers,O. Y1 .....7.925
Youngstown U5 .....7.925

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.575
Houston(9) S5 .....5.675
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ...5.425
Sterling,Ill. N15 .....5.525
Sterling,Ill.(1) N15 ...5.425
Tonawanda,N.Y. B12 ..5.425

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....5.425
Atlanta A11 .....5.625
Joliet,Ill. P22 .....5.425
Niles,Calif. P1 .....6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ....6.175
SanFrancisco S7 .....6.275
Seattle B3 .....6.175

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.55
Clairton,Pa. U5 .....6.55
Gary,Ind. U5 .....6.55
Houston S5 .....6.80
KansasCity,Mo. S5 ....6.80
Pittsburgh J5 .....6.55
Youngstown U5 .....6.55

BARS, C.F., Leaded Alloy (Including leaded extra)
Ambridge,Pa. W18 ...9.925
BeaverFalls,Pa. M12 ..9.925
Camden,N.J. P13 ....10.10
Chicago W18 .....9.925
Cleveland C20 .....9.925
Elyria,O. W8 .....9.925
LosAngeles P2, S30
(Grade A) 11.30
(Grade B) 11.80
Monaca,Pa. S17 .....9.925
Newark,N.J. W18 ....10.10
SpringCity,Pa. K3 ....10.10
Warren,O. C17 .....9.925

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.30
BeaverFalls,Pa. M12,R2 7.30
Birmingham C15 .....7.90
Bridgeport,Conn. N19 ..7.65
Buffalo B5 .....7.35
Camden,N.J. P13 .....7.75
Carnegie,Pa. C12 .....7.30
Chicago W18 .....7.30
Cleveland A7, C20 ....7.30
Detroit B5, P17 .....7.50
Detroit S41 .....7.30
Donora,Pa. A7 .....7.30
Elyria,O. W8 .....7.30
FranklinPark,Ill. N5 ...7.30
Gary,Ind. R2 .....7.30
GreenBay,Wis. F7 .....7.30
Hammond,Ind. J5, L2 ..7.30
Hartford,Conn. R2 .....7.80
Harvey,Ill. B5 .....7.30
LosAngeles (49), S30 ..8.75
LosAngeles P2, R2 ...8.75
Mansfield,Mass. B5 ....7.85
Massillon,O. R2, R8 ....7.30
Midland,Pa. C18 .....7.30
Monaca,Pa. S17 .....7.30
Newark,N.J. W18 .....7.75
NewCastle,Pa.(17) B4 ..7.30
Pittsburgh J5 .....7.30
Plymouth,Mich. P5 ....7.55
Putnam,Conn. W18 .....7.85
Readville,Mass. C14 ....7.85
S.Chicago,Ill. W14 .....7.30
SpringCity,Pa. K3 .....7.75
Struthers,O. Y1 .....7.30
Warren,O. C17 .....7.30
Willimantic,Conn. J5 ..7.80
Waukegan,Ill. A7 .....7.30
Youngstown F3, Y1 ....7.30

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....8.775
BeaverFalls,Pa.M12,R2 8.775
Bethlehem,Pa. B2 .....8.775
Bridgeport,Conn. N19 ..8.925
Buffalo B5 .....8.775
Camden,N.J. P13 .....8.95
Canton,O. T7 .....8.775
Carnegie,Pa. C12 .....8.775
Chicago W18 .....8.775
Cleveland A7, C20 ....8.775
Detroit B5, P17 .....8.975
Detroit S41 .....8.775
Donora,Pa. A7 .....8.775
Elyria,O. W8 .....8.775
FranklinPark,Ill. N5 ..8.775
Gary,Ind. R2 .....8.775
GreenBay,Wis. F7 .....8.775
Hammond,Ind. J5, L2..8.775
Hartford,Conn. R2 .....9.075
Harvey,Ill. B5 .....8.775
Lackawanna,N.Y. B2 ..8.775
LosAngeles P2 .....10.65
LosAngeles S30 .....10.75
Mansfield,Mass. B5 ...9.075
Massillon,O. R2, R8 ..8.775
Midland,Pa. C18 .....8.775
Monaca,Pa. S17 .....8.775
Newark,N.J. W18 .....8.95
Plymouth,Mich. P5 ....8.975
S.Chicago W14 .....8.775
SpringCity,Pa. K3 .....8.95
Struthers,O. Y1 .....8.775
Warren,O. C17 .....8.775
Waukegan,Ill. A7 .....8.775
Worcester,Mass. A7 ....9.075
Youngstown F3, Y1 ....8.775

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 ....5.425
Atlanta A11 .....5.625
Birmingham C15, S42 .5.425
Bridgeport,Conn. N19 ..5.65
Buffalo R2 .....5.425
Cleveland R2 .....5.425
Ecorse,Mich. G5 .....5.775
Emeryville,Calif. J7 ..6.175
Fairfield,Ala. T2 ....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 ....6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1 5.425
Johnstown,Pa. B2 ....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 ...5.675
Lackawanna,N.Y. B2..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 .....6.125
Pittsburg,Calif. C11 ..6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ....6.175
SandSprings,Okla. S5 ..5.925
Seattle B3, N14 .....6.175
S.Chicago,Ill. R2 .....5.425
S.Duquesne,Pa. U5 ....5.425
S.SanFrancisco B3 ....6.175
SparrowsPoint,Md. B2.5.425
Sterling,Ill.(1) N15 ..5.425
Sterling,Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..6.00
Torrance,Calif. C11....6.125
Youngstown R2, U5 ..5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2 .....7.65
Chicago U8 .....6.91
Cleveland U8 .....6.89
Johnstown,Pa. B2 ....7.08
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..6.85
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Philadelphia U8 .....7.38
Pittsburgh J5, U8 ....7.10
Seattle B3, N14 .....7.70
SparrowsPt.,Md. B2 ....7.08
St.Paul U8 .....7.92
Williamsport,Pa. S19 ..7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy,(Staybolt)B14 18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2.5.325
ChicagoHts.(4)(44) I-2,.5.425
ChicagoHts.(4) C2 ....5.425
Ft.Worth,Tex.(26) T4..5.875
Franklin,Pa. (3) F5 ..5.325
Franklin,Pa. (4) F5 ..5.425
JerseyShore,Pa.(3) J8 ..5.30
Marion,O.(3) P11 ....5.325
Tonawanda(3) R12 ...5.325
Tonawanda(4) B12 ....6.00
Williamsport,Pa. (3)S19 5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 ....4.925
Allenport,Pa. P7 .....4.925
Ashland,Ky.(8) A10 ..4.925
Cleveland J5, R2 ....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 ....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....4.925
Geneva,Utah C11 ....5.025
GraniteCity,Ill.(8) G4..5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2 .4.925
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ..4.925
Niles,O. M21, S3 .....4.925
Pittsburg,Calif. C11 ..5.625
Pittsburgh J5 .....4.925
Portsmouth,O. P12 ....4.925
Riverdale,Ill. A1 ....4.925
Sharon,Pa. S3 .....4.925
S.Chicago,Ill. W14 ....4.925
SparrowsPoint,Md. B2 .4.925
Steubenville,O. W10 ..4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ..4.925
Youngstown U5, Y1 ..4.925

SHEETS, H.R.,(19 Ga. & Lighter)

Niles,O. M21 .....6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 ....8.10
Irvin,Pa. U5 .....8.10
Munhall,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ...8.10

SHEETS, H.R.(14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2 ....7.275
Conshohocken,Pa. A3..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 .....7.275
Fairless,Pa. U5 .....7.325
Farrell,Pa. S3 .....7.275
Fontana,Calif. K1 ....8.175
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna (35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 .....7.275
SparrowsPoint(36) B2 .7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 ...7.275
Youngstown U5, Y1 ..7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.80
Middletown,O. A10 ....6.55
Warren,O. R2 .....6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.05
Allenport,Pa. P7 .....6.05
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ..6.05
Fontana,Calif. K1 ....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 ....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..6.05
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ...7.00
Pittsburgh J5 .....6.05
Portsmouth,O. P12 ....6.05
SparrowsPoint,Md. B2 ..6.05
Steubenville,O. W10 ...6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 ....6.05
Yorkville,O. W10 .....6.05
Youngstown Y1 .....6.05

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 ....8.975
Ecorse,Mich. G5 .....9.075
Fairless,Pa. U5 .....9.025
Fontana,Calif. K1....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 .....8.975
Lackawanna (37) B2 ..8.975
Pittsburgh J5 .....8.975
SparrowsPoint (38) B2 8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 ....8.975
Youngstown Y1 .....8.975

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	.6.95	7.20
Canton,O. R2	....6.95	7.45
Fairfield T2	....6.95	7.20
Gary,Ind. U5	....6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	..6.95	7.20
Irvin,Pa. U5	....6.95	7.20
Kokomo,Ind. C16	7.05	...
MartinsFry. W10	.6.95	7.20
Pitts.,Calif. C11	..7.70	...
Pittsburgh J5	....6.95	...
SparrowsPt. B2	..6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 .. 7.20

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 ....6.60‡
Ashland,Ky. A10 ....6.60†
Canton,O. R2 .....6.60‡
Dover,O. R1 .....6.60†
Fairfield,Ala. T2 ....6.60†
Gary,Ind. U5 .....6.60*
GraniteCity,Ill. G4 ....6.80*
Ind.Harbor,Ind. I-2 ....6.60†
Irvin,Pa. U5 .....6.60*
Kokomo,Ind. C16 ....6.70‡
MartinsFerry,O. W10 ..6.60*
Middletown,O. A10 ..6.60†
Pittsburg,Calif. C11 ...7.35*
Pittsburgh J5 .....6.60†
SparrowsPt.,Md. B2 ..6.60†
Warren,O. R2 .....6.60†
Weirton,W.Va. W6 ....6.60*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ..9.725

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....6.85
Middletown,O. A10 ....6.85

SHEETS, Electrogalvanized

Cleveland (28) R2 ...7.425
Niles,O. (28) R2 ....7.425
Weirton,W.Va. W6 ..7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .9.25
Butler,Pa. A10 (type 2) .9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.625
Cleveland R2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill. G4 ....6.825
Ind.Harbor,Ind. I-2,Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 ....6.625
Niles,O. M21, S3 ....6.625
Youngstown Y1 .....6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ..8.65
Ind.Harbor,Ind. I-2 ..8.475
Yorkville,O. W10 ....8.475

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.90
Gary,Ind. U5 .....7.00
Mansfield,O. E6 .....7.00
Middletown,O. A10 ....7.00
Niles,O. M21, S3 ....7.00
Warren,O. R2 .....7.00
Weirton,W.Va. W6 ....7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.40

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve.Cold Rolling Mills
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Div., Sharon Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
GS Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md.Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.
M22 Mill Strip Products Co.

N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelson Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N19 Northeastern Steel Corp.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div. Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Div. Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.925
Allenport,Pa. P7	4.925
Alton,Ill. L1	5.125
Ashland,Ky.(8) A10	4.925
Atlanta A11	5.125
Bessemer,Ala. T2	4.925
Birmingham C15	4.925
Buffalo (27) R2	4.925
Conshohocken,Pa. A3	4.975
Detroit M1	5.025
Ecorse,Mich. G5	5.025
Fairfield,Ala. T2	4.925
Fontana, Calif. K1	5.825
Gary,Ind. U5	4.925
Ind.Harbor,Ind. I-2, Y1	4.925
Johnstown,Pa. (25) B2	4.925
Lackaw'na,N.Y.(25) B2	4.925
LosAngeles(25) B3	5.675
Minnequa,Colo. C10	6.025
Pittsburg,Calif. C11	5.675
Riverdale,Ill. A1	4.925
SanFrancisco S7	6.35
Seattle(25) B3	6.35
Seattle N14	6.35
Sharon,Pa. S3	4.925
S.SanFrancisco(25) B3	5.675
SparrowsPoint,Md. B2	4.925
Sterling,Ill. (1) N15	4.925
Sterling,Ill. N15	5.025
Torrance,Calif. C11	5.675
Warren,O. R2	4.925
Weirton,W.Va. W6	4.925
Youngstown U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.10
Farrell,Pa. S3	8.10
Gary,Ind. U5	8.10
Houston S5	8.35
Ind.Harbor,Ind. Y1	8.10
KansasCity,Mo. S5	8.35
LosAngeles B3	9.30
Lowellville,O. S3	8.10
Newport,Ky. A2	8.10
Sharon, Pa. A2	8.10
S.Chicago,Ill. W14	8.10
Youngstown U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	7.325
Conshohocken,Pa. A3	7.325
Ecorse,Mich. G5	7.425
Fairfield,Ala. T2	7.325
Farrell,Pa. S3	7.325
Gary,Ind. U5	7.325
Ind.Harbor,Ind. I-2, Y1	7.325
Lackawanna,N.Y. B2	7.325
LosAngeles(25) B3	8.075
Seattle(25) B3	8.325
Sharon,Pa. S3	7.325
S.Chicago,Ill. W14	7.325
S.SanFrancisco(25) B3	8.075
SparrowsPoint,Md. B2	7.325
Warren,O. R2	7.325
Weirton,W.Va. W6	7.325
Youngstown U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.175
Warren,O. R2	5.675

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.15
Baltimore T6	7.15
Boston T6	7.70
Buffalo S40	7.15
Cleveland A7, J5	7.15
Conshohocken,Pa. A3	7.20
Dearborn,Mich. D3	7.25
Detroit D2, M1, P20	7.25
Dover,O. G6	7.15
Ecorse,Mich. G5	7.25
Evanston,Ill. M22	7.25
Follansbee,W.Va. F4	7.15
Fontana,Calif. K1	9.00
Franklin Park,Ill. T6	7.25
Ind.Harbor,Ind. Y1	7.15
Indianapolis J5	7.30
LosAngeles J5	9.05
LosAngeles C1	9.20
NewBedford,Mass. R10	7.60
NewBritain(10) S15	7.15
NewCastle,Pa. B4, E5	7.15
NewHaven,Conn. D2	7.60
NewKensington,Pa. A6	7.15
Pawtucket,R.I. R3	7.80
Pawtucket,R.I. N8	7.70
Philadelphia(45) P24	7.70
Pittsburgh J5	7.15
Riverdale,Ill. A1	7.25
Rome,N.Y. (32) R6	7.15
Sharon,Pa. S3	7.15
Trenton,N.J. (31) R5	8.60
Wallingford,Conn. W2	7.60
Warren,O. R2, T5	7.15
Weirton,W.Va. W6	7.15
Worcester,Mass. A7	7.70
Youngstown J5, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	15.40
Carnegie,Pa. S18	15.05
Cleveland A7	15.05
Dover,O. G6	15.05
Farrell,Pa. S3	15.05
FranklinPark,Ill. T6	15.05
Harrison,N.J. C18	15.05
Indianapolis J5	15.20
Lowellville,O. S3	15.05
Pawtucket,R.I. N8	15.40
Riverdale,Ill. A1	15.05
Sharon,Pa. S3	15.05
Worcester,Mass. A7	15.35
Youngstown J5	15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.45
Dearborn,Mich. D3	10.60
Dover,O. G6	10.45
Ecorse,Mich. G5	10.55
Farrell,Pa. S3	10.50
Ind.Harbor,Ind. Y1	10.65
Sharon,Pa. S3	10.50
Warren,O. R2	10.45
Weirton,W.Va. W6	10.50
Youngstown Y1	10.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	7.90

STRIP, C.R. Electrogalvanized

Cleveland A7	7.15*
Dover,O. G6	7.15*
Evanston,Ill. M22	7.25*
Riverdale,Ill. A1	7.25*
Warren,O. B9, T5	7.15*
Worcester,Mass. A7	7.70*
Youngstown J5	7.15*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	7.275

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Riverdale,Ill. A1	5.50
Sharon,Pa. S3	5.35
Youngstown U5	5.35

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	....	....
Fostoria,O. S1	10.05	11.15	13.10	16.10	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles J5	11.15	12.60	14.80	....	....
NewBritain,Conn.(10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.10	21.95	26.30
Buffalo W12	...	...	18.10	....	....
Fostoria,O. S1	...	...	18.30	22.15	....
FranklinPark,Ill. T6	...	...	18.45	22.30	26.65
Harrison,N.J. C18	...	...	18.10	21.95	26.30
NewYork W3	...	...	18.10	21.95	26.30
Palmer,Mass. W12	...	...	18.10	....	....
Trenton,N.J. R5	...	...	18.10	21.95	26.30
Worcester,Mass. A7, T6	...	...	18.10	21.95	26.30
Youngstown J5	...	...	18.45	22.30	26.65

SILICON STEEL

H.R.SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.80	12.90	13.95
Mansfield,O. E6	9.625	11.10	11.80	12.90	13.95
Newport,Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles,O. M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift,Pa. U5	....	11.10	11.80	12.90	13.95
Warren,O. R2	9.625	11.10	11.80	12.90	....
Zanesville,O. A10	....	11.10	11.80	12.90	13.95
Zanesville,O. A10 (SP Coils)	....	....	11.55	12.65	13.70

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.35	12.05	13.15	14.20
Brackenridge,Pa. A4	....	....	12.05	13.15	14.20
GraniteCity,Ill. G4	9.825*	11.05*	11.75*	12.85*	....
IndianaHarbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	9.625*	11.35	12.05	13.50	14.20
Vandergrift,Pa. U5	9.625*	11.35	12.05	13.15	14.20
Warren,O. R2	9.625*	11.35	12.05	13.15	14.20
Zanesville,O. A10(FP Coils)	...	11.35	12.05	13.15	14.20

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grades T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift,Pa. U5	14.75	15.55	16.05	17.10
Zanesville,O. A10	15.00	15.55	16.05	17.10

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	17.60	19.20	19.70	20.20	....
Butler,Pa. A10	....	....	....	19.20	19.70	20.20	....
Vandergrift,Pa. U5	..	16.60	17.60	19.20	19.70	20.20	15.25**
Warren,O. R2	.....	....	....	....	....	....	15.25‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	7.725	7.925	....
Niles,O. R2	7.725	7.925	8.125

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa.J5	$10.05	$10.30
Fairfield,Ala.T2	10.15	10.40
Fairless,Pa. U5.	10.15	10.40
Fontana,Calif.K1	10.80	11.05
Gary,Ind. U5 ..	10.05	10.30
Irvin,Pa. U5 ..	10.05	10.30
Pitts.,Calif. C11.	10.80	11.05
Sp.Pt.,Md. B2 ..	10.15	10.40
Weirton,W.Va.W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.85
Fairfield,Ala. T2	7.95
Fairless,Pa. U5	7.95
Fontana,Calif. K1	8.60
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. I-2, Y1	7.85
Irvin,Pa. U5	7.85
Niles,O. R2	7.85
Pittsburg,Calif. C11	8.60
SparrowsPoint,Md. B2	7.95
Weirton,W.Va. W6	7.85
Yorkville,O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	$7.50
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind. Y1	7.50
Irvin,Pa. U5	7.50
Yorkville,O. W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.65
Aliquippa,Pa. J5	7.65
Alton,Ill. L1	7.85
Atlanta A11	7.85
Bartonville,Ill. K4	7.75
Buffalo W12	7.65
Chicago W13	7.65
Cleveland A7, C20	7.65
Crawfordsville,Ind. M8	7.75
Donora,Pa. A7	7.65
Duluth A7	7.65
Fairfield,Ala. T2	7.65
Fostoria,O.(24) S1	7.75
Houston S5	7.90
Jacksonville,Fla. M8	8.00
Johnstown,Pa. B2	7.65
Joliet,Ill. A7	7.65
KansasCity,Mo. S5	7.90
Kokomo,Ind. C16	7.75
LosAngeles B3	8.60
Minnequa,Colo. C10	7.90
Monessen,Pa. P7, P16	7.65
N.Tonawanda,N.Y. B11	7.65
Palmer,Mass. W12	7.95
Pittsburg,Calif. C11	8.60
Portsmouth,O. P12	7.65
Rankin,Pa. A7	7.65
S.Chicago,Ill. R2	7.65
S.SanFrancisco C10	8.60
SparrowsPoint,Md. B2	7.75
Sterling,Ill.(1) N15	7.65
Sterling,Ill. N15	7.75
Struthers,O. Y1	7.65
Waukegan,Ill. A7	7.65
Worcester,Mass. A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	12.65
Buffalo W12	12.65
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	12.65
Minnequa,Colo. C10	12.775
Monessen,Pa. P16	12.65
Muncie,Ind. I-7	12.85
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	12.95
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	12.75
Struthers,O. Y1	12.65
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
NewHaven,Conn. A7	9.60
Palmer,Mass. W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,Mass. A7	9.60

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Bartonville,Ill. K4	9.40
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Milbury,Mass.(12) N6	9.60
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
Muncie,Ind. I-7	9.50
Palmer,Mass.(12) W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,A7, J4, T6	9.60

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	15.80
Bartonville,Ill. K4	15.70
Buffalo W12	15.60
Chicago W13	15.60
Cleveland A7	15.60
Crawfordsville,Ind. M8	15.70
Fostoria,O. S1	15.60
Houston S5	15.85
Jacksonville,Fla. M8	15.95
Johnstown,Pa. B2	15.60
KansasCity,Mo. S5	15.85
Kokomo,Ind. C16	15.60
Minnequa,Colo. C10	15.85
Monessen,Pa. P7, P16	15.60
Muncie,Ind. I-7	15.80
Palmer,Mass. W12	15.90
S.SanFrancisco C10	16.45
Waukegan,Ill. A7	15.60
Worcester,Mass. A7, T6	15.90

ROPE WIRE

Bartonville,Ill. K4	12.75
Buffalo W12	12.75
Fostoria,O. S1	12.75
Johnstown,Pa. B2	12.75
Monessen,Pa. P7	12.75
Muncie,Ind. I-7	12.95
Palmer,Mass. W12	13.05
Portsmouth,O. P12	12.75
Roebling,N.J. R5	13.05
SparrowsPt.,Md. B2	12.85
Struthers,O. Y1	12.75
Worcester,Mass. J4	13.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4 ....16.55
Monessen,Pa. P16 ....16.55
Roebling,N.J. R5 .....17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 .....11.65
Baltimore T6 .....11.95
Boston T6 .....11.95
Buffalo W12 .....11.65
Chicago W13 .....11.75
Cleveland A7 .....11.65
Crawfordsville,Ind. M8.11.65
Dover,O. G6 .....11.65
Fostoria,O. S1 .....11.95
FranklinPark,Ill. T6 ..11.75
Kokomo,Ind. C16 .....11.65
Massillon,O. R8 .....11.65
Milwaukee C23 .....11.85
Monessen,Pa. P7, P16..11.65
Palmer,Mass. W12 ....11.95
Pawtucket,R.I. N8 ....11.95
Philadelphia P24 .....11.95
Riverdale,Ill. A1 .....11.75
Rome,N.Y. R6 .....11.65
Sharon,Pa. S3 .....11.65
Trenton,N.J. R5 .....11.95
Warren,O. B9 .....11.65
Worcester,Mass. A7, T6 11.95

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2 ...173
Aliquippa,Pa. J5 173
Atlanta A11 175
Bartonville,Ill. K4 175
Chicago W13 173
Cleveland A9 173
Crawfordsville,Ind. M8 ..175
Donora,Pa. A7 173
Duluth A7 173
Fairfield,Ala. T2 173
Houston,Tex. S5 178
Jacksonville,Fla.(20) M8.184
Johnstown,Pa. B2 173
Joliet,Ill. A7 173
KansasCity,Mo. S5 178
Kokomo,Ind. C16 175
Minnequa,Colo. C10 178
Monessen,Pa. P7 173
Pittsburg,Calif. C11 192
Rankin,Pa. A7 173
S.Chicago,Ill. R2 173
SparrowsPt.,Md. B2 175
Sterling,Ill.(7) N15 175
Worcester,Mass. A7 179

(To Wholesalers; per cwt)

Galveston,Tex. D7 ....$9.10

NAILS, Cut (100 lb keg)

To Dealers (33)

Conshohocken,Pa. A3 ..$9.80
Wheeling,W.Va. W10 ...9.80

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2 ...175
Aliquippa,Pa. J5 175
Atlanta A11 177
Bartonville,Ill. K4 177
Crawfordsville,Ind. M8 ..177
Donora,Pa. A7 175
Duluth A7 175
Fairfield,Ala. T2 175
Jacksonville,Fla.(20) M8.186
Johnstown,Pa. B2 175
Joliet,Ill. A7 175
Kokomo,Ind. C16 177
Minnequa,Colo. C10 180
Pittsburg,Calif. C11 194
Rankin,Pa. A7 175
S.Chicago,Ill. R2 175
SparrowsPt.,Md. B2 177
Sterling,Ill.(7) N15 175
Worcester,Mass. A7 181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)

Coil No. 3150

AlabamaCity,Ala. R2.$10.26
Atlanta A11 .....10.36
Bartonville,Ill. K4 .....10.36
Buffalo W12 .....10.26
Chicago W13 .....10.26
Crawfordsville,Ind. M8.10.36
Donora,Pa. A7 .....10.26
Duluth A7 .....10.26
Fairfield,Ala. T2 .....10.26
Houston S5 .....10.51
Jacksonville,Fla. M8 ..10.82
Johnstown,Pa. B2 .....10.26
Joliet,Ill. A7 .....10.26
KansasCity,Mo. S5 .....10.51
Kokomo,Ind. C16 .....10.36
LosAngeles B3 .....11.05
Minnequa,Colo. C10 ....10.51
Pittsburg,Calif. C11 ...11.04
S.Chicago,Ill. R2 .....10.26
S.SanFrancisco C10 ...11.04
SparrowsPt.,Md. B2 ...10.36
Sterling,Ill.(37) N15 ..10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2..$10.60
Atlanta A11 .....10.70
Bartonville,Ill. K4 ....10.70
Buffalo W12 .....10.60
Chicago W13 .....10.60
Crawfordsville,Ind. M8..10.70
Donora,Pa. A7 .....10.60
Duluth A7 .....10.60
Fairfield,Ala. T2 .....10.60
Houston S5 .....10.85
Jacksonville,Fla. M8 ..11.16
Johnstown,Pa. B2 ....10.60
Joliet,Ill. A7 .....10.60
KansasCity,Mo. S5 ....10.85
Kokomo,Ind. C16 .....10.70
LosAngeles B3 .....11.40
Minnequa,Colo. C10 ...10.85
Pittsburg,Calif. C11 ...11.40
S.Chicago,Ill. R2 .....10.60
S.San Francisco C10 ...11.40
SparrowsPt.,Md. B2 ...10.70
Sterling,Ill.(37) N15 ..10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2..$10.65
Atlanta A11 .....10.75
Bartonville,Ill. K4 ....10.75
Buffalo W12 .....10.65
Chicago W13 .....10.65
Crawfordsville,Ind. M8.10.75
Donora,Pa. A7 .....10.65
Duluth A7 .....10.65
Fairfield,Ala. T2 .....10.65
Houston S5 .....10.90
Jacksonville,Fla. M8 ..11.21
Johnstown,Pa. B2 ....10.65
Joliet,Ill. A7 .....10.65
KansasCity,Mo. S5 ....10.90
Kokomo,Ind. C16 .....10.75
LosAngeles B3 .....11.45
Minnequa,Colo. C10 ...10.90
Pittsburg,Calif. C11 ...11.45
S.Chicago,Ill. R2 .....10.65
S.SanFrancisco C10 ...11.45
SparrowsPt.,Md. B2 ...10.75
Sterling,Ill.(37) N15 ..10.75

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2 ...212
Atlanta A11 214
Bartonville,Ill. K4 214
Crawfordsville,Ind. M8 ..214
Donora,Pa. A7 212
Duluth A7 212
Fairfield,Ala. T2 212
Houston S5 217
Jacksonville,Fla. M8 ...219
Joliet,Ill. A7 212
KansasCity,Mo. S5 217
Kokomo,Ind. C16 214
Minnequa,Colo. C10 217
Pittsburg,Calif. C11 236
S.SanFrancisco C10 236
SparrowsPt.,Md. B2 214
Sterling,Ill.(7) N15 214
Williamsport,Pa. S19 175

FENCE POSTS

Birmingham C15 171
ChicagoHts.,Ill. C2, I-2..172
Duluth A7 172
Franklin,Pa. F5 172
Huntington,W.Va. C15 ..171
Johnstown,Pa. B2 172
Marion,O. P11 172
Minnequa,Colo. C10 177
Sterling,Ill.(1) N15 172
Tonawanda,N.Y. B12 ...174

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2..193**
Aliquippa,Pa. J5 .....190§
Atlanta A11 .....198*
Bartonville,Ill. K4 198
Crawfordsville,Ind. M8 ..198
Donora,Pa. A7 .....193†
Duluth A7 .....193†
Fairfield,Ala. T2 .....193†
Houston,Tex. S5 .....198**
Jacksonville,Fla. M8 203
Johnstown,Pa. B2 .....196§
Joliet,Ill. A7 .....193†
KansasCity,Mo. S5 ....198**
Kokomo,Ind. C16 .....195†
Minnequa,Colo. C10 ....198**
Monessen,Pa. P7 .....196*
Pittsburg,Calif. C11 ...213†
Rankin,Pa. A7 .....193†
S.Chicago,Ill. R2 .....193**
S.SanFrancisco C10 ...213**
SparrowsPoint,Md. B2..198§
Sterling,Ill.(7) N15 ....198§

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2 .....187**
Aliq'ppa,Pa.9-14½ga.J5 190§
Atlanta A11 .....192*
Bartonville,Ill. K4 192
Crawfordsville,Ind. M8 ..192
Donora,Pa. A7 .....187†
Duluth A7 .....187†
Fairfield,Ala. T2 .....187†
Houston,Tex. S5 .....192**
Jacksonville,Fla. M8 197
Johnstown,Pa.(43) B2 ..190§
Joliet,Ill. A7 .....187†
KansasCity,Mo. S5 ....192**
Kokomo,Ind. C16 .....189†
Minnequa,Colo. C10 ...192**
Pittsburg,Calif. C11 ...210†
Rankin,Pa. A7 .....187†
S.Chicago,Ill. R2 .....187**
Sterling,Ill.(7) N15 ....192§

WIRE (16 gage)	**An'ld Galv. Stone**	**Stone**
Ala.City,Ala.R2	17.15	18.70**
Aliq'ppa,Pa. J5.	17.15	18.95
Bartonville K4.	17.25	19.05
Cleveland A7	17.15	....
Crawf'dsville M8	17.25	19.05
Fostoria,O. S1	17.65	19.20†
Houston S5	17.40	18.95**
Jacksonville M8	17.50	19.30
Johnstown B2	17.15	18.95§
Kan.City,Mo. S5	17.40	....
Kokomo C16	17.25	18.80†
Minnequa C10	17.40	18.95**
P'lm'r,Mass.W12	17.45	19.00†
Pitts.,Calif. C11	17.50	19.05†
SparrowsPt. B2	17.25	19.05§
Sterling(37) N15	17.25	19.05§
Waukegan A7	17.15	18.70†
Worcester A7	17.45	....

WIRE, Merchant Quality

(6 to 8 gage)	**An'ld Galv.**
Ala.City,Ala. R2	8.65 9.20**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	8.75 9.425*
Bartonville(48) K4	8.75 9.425
Buffalo W12	8.65 9.20†
Cleveland A7	8.65 ....
Crawfordsville M8	8.75 9.425
Donora,Pa. A7	8.65 9.20†
Duluth A7	8.65 9.20†
Fairfield T2	8.65 9.20†
Houston(48) S5	8.90 9.45**
Jacks'ville,Fla. M8	9.00 9.675
Johnstown B2(48)	8.65 9.325§
Joliet,Ill. A7	8.65 9.20†
Kans.City(48) S5	8.90 9.45**
Kokomo C16	8.75 9.30†
LosAngeles B3	9.60 10.275§
Minnequa C10	8.90 9.45**
Monessen P7(48)	8.65 9.25*
Palmer,Mass. W12	8.95 9.50†
Pitts.,Calif. C11	9.60 10.15†
Rankin,Pa. A7	8.65 9.20†
S.Chicago R2	8.65 9.20**
S.SanFran. C10	9.60 10.15**
Spar'wsPt.B2(48)	8.75 9.425§
Sterling(48) N15	8.90 9.575§
Sterling(1)(48)	8.80 9.475§
Struth'rs,O.(48)Y1	8.65 9.30‡
Worcester,Mass.A7	8.95 9.50†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)
½ in. and smaller:
6 in. and shorter.... 49.0
Longer than 6 in. .. 39.0
⅝ in. thru 1 in.:
6 in. and shorter.... 39.0
Longer than 6 in. .. 35.0
1⅛ in. and larger:
All lengths 35.0
Undersized Body (rolled thread)
½ in. and smaller:
6 in. and shorter... 49.0

Carriage, Machine, Lag Bolts

Hot Galvanized:
½ in. and smaller:
6 in. and shorter... 29.0
Longer than 6 in. .. 15.0
⅝ in. and larger:
All lengths 12.0

Lag Bolts (all diam.)
6 in. and shorter... 49.0
Longer than 6 in. .. 39.0

Plow and Tap Bolts
½ in. and smaller by 6 in. and shorter 49.0
Larger than ½ in. or longer than 6 in. .. 39.0

Blank Bolts 39.0

Step, Elevator, Tire Bolts 49.0

Stove Bolts, Slotted:
⅛ to ¼-in. incl., 3 in. and shorter.. 55.0
5/16 to ½ in., inclusive 55.0

NUTS

Reg. & Heavy Square Nuts:
All sizes 55.5

Square Nuts, Reg. & Heavy, Hot Galvanized:
All sizes 41.0

Hex Nuts, Reg. & Heavy, Hot Pressed:
¾ in. and smaller.. 60.5
⅞ in. to 1 in., incl. 55.5
1⅛ in. to 1½ in., incl. 58.5
1⅝ in. and larger.. 53.5

Hex Nuts, Reg. & Heavy, Cold Punched:
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5

Hex Nuts, All Types, Hot Galvanized:
¾ in. and smaller.. 46.5
⅞ in. to 1 in., incl. 41.5
1⅛ in. to 1½ in., incl. 46.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5

Hex Nuts, Finished (Incl. Slotted and Castellated):
1 in. and smaller.. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):
⅝ in. and smaller.. 60.5
¾ in. to 1 in., incl. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Capscrews, Coarse or Fine Thread, Bright:
6 in. and shorter:
⅝ in. and smaller.. 40.0
¾, ⅞, and 1 in. diam. 22.0
Longer than 6 in.:
⅝ in. and smaller.. 8.0
¾, ⅞, and 1 in. diam. ..... +6.0

High Carbon, Heat Treated:
6 in. and shorter:
⅝ in. and smaller.. 26.0
¾, ⅞, and 1 in. diam. 3.0
Longer than 6 in.:
⅝ in. and smaller..+13.0
¾, ⅞, and 1 in. diam. .....+32.0

Flat Head Capscrews:
¾ in. and smaller..+76.0

Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam.:
6 in. and shorter... Net
Longer than 6 in...+23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.25
7/16 in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	....
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	....
Johnstown,Pa. B2	....	....	...(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	....
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2 .....6.60
Gary,Ind. U5 .....6.60
Ind.Harbor,Ind. I-2 ....6.60
Lackawanna,N.Y. B2 ..6.60
Minnequa,Colo. C10 ....6.60
Seattle B3 .....6.75
Steelton,Pa. B2 .....6.60
Torrance,Calif. C11 ....6.75

JOINT BARS

Bessemer,Pa. U5 .....6.975
Fairfield,Ala. T2 .....6.975
Ind.Harbor,Ind. I-2 ....6.975
Joliet,Ill. U5 .....6.975
Lackawanna,N.Y. B2..6.975
Minnequa,Colo. C10 ..6.975
Steelton,Pa. B2 .....6.975

AXLES

Ind.Harbor,Ind. S13 ...8.775
Johnstown,Pa. B2 ....8.775

TRACK BOLTS, Untreated

Cleveland R2 .....14.75
KansasCity,Mo. S5 ....14.75
Lebanon,Pa. B2 .....14.75
Minnequa,Colo. C10 ...14.75
Pittsburgh P14 .....14.75
Seattle B3 .....15.25

SCREW SPIKES

Lebanon,Pa. B2 .....14.50

STANDARD TRACK SPIKES

Fairfield, Ala. T2 .....9.75
Ind.Harbor,Ind. I-2, Y1.9.75
KansasCity,Mo. S5 ....9.75
Lebanon,Pa. B2 .....9.75
Minnequa,Colo. C10 ....9.75
Pittsburgh J5 .....9.75
Seattle B3 .....10.25
S.Chicago,Ill. R2 .....9.75
Struthers,O. Y1 .....9.75
Youngstown R2 .....9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 13 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 6.045c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(45) 0.022 in. and lighter, over 0.022" 8.20c.
(46) Special quality.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.30c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft.	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	....	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	....	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.50	55.50
304L	....	....	48.25	51.50	53.00	55.50	58.50	63.25	63.25
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	....	....	86.50	....	92.75	....	104.50
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	81.50	81.50
316L	....	....	70.00	76.50	77.00	80.75	84.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	....	....	106.75	....	106.75	106.75	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	36.25	48.25	48.25
420	....	33.50	34.25	41.75	39.25	41.25	45.25	62.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	36.75	51.75	51.75
431	....	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co., Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	34.70	37.95	42.25	46.70	40.00
304L	36.90	40.55	45.10	49.85	....
316	40.35	44.40	49.50	54.50	58.75
316L	45.05	49.35	54.70	60.10	....
316 Cb	47.30	53.80	61.45	69.10	....
321	36.60	40.05	44.60	49.30	47.25
347	38.25	42.40	47.55	52.80	57.00
405	28.60	29.85	33.35	36.85	....
410	28.15	29.55	33.10	36.70	....
430	28.30	29.80	33.55	37.25	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	62.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.95	40.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	*Cr-Hot Work*	*0.475*
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	*V-Cr Hot Work*	*0.520*
Oil Hardening	0.475	*Hi-Carbon-Cr*	*0.925*

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.285
18.25	4.25	1	4.75	...	2.500
18	4	2	9	...	2.870
18	4	2	....	...	1.960
18	4	1	....	...	1.795
9	3.5	..	....	...	1.395
13.5	4	3	....	...	2.060
13.75	3.75	2	5	...	2.440
6.4	4.5	1.9	....	5	1.300
6	4	3	....	6	1.545
1.5	4	1	....	8.5	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
AlabamaCity,Ala. R2	62.00	62.50	....	....
Birmingham R2	62.00	62.50‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward,Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	....	66.50	....
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.62	69.12	69.12	69.62
Muskegon,Mich., deld.	....	74.12	74.12	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	66.50	67.00	67.50	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.10	75.60	....
Newark,N.J., deld.	72.29	72.79	73.29	73.79
Philadelphia, deld.	70.01	70.51	71.01	71.59
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa., deld.	....	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield,Ohio, deld.	70.90	....	71.40	71.90
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	78.00
Buffalo H1	79.22

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry, $9 freight alowed K2	103.56
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.56

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Troy,N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.22
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

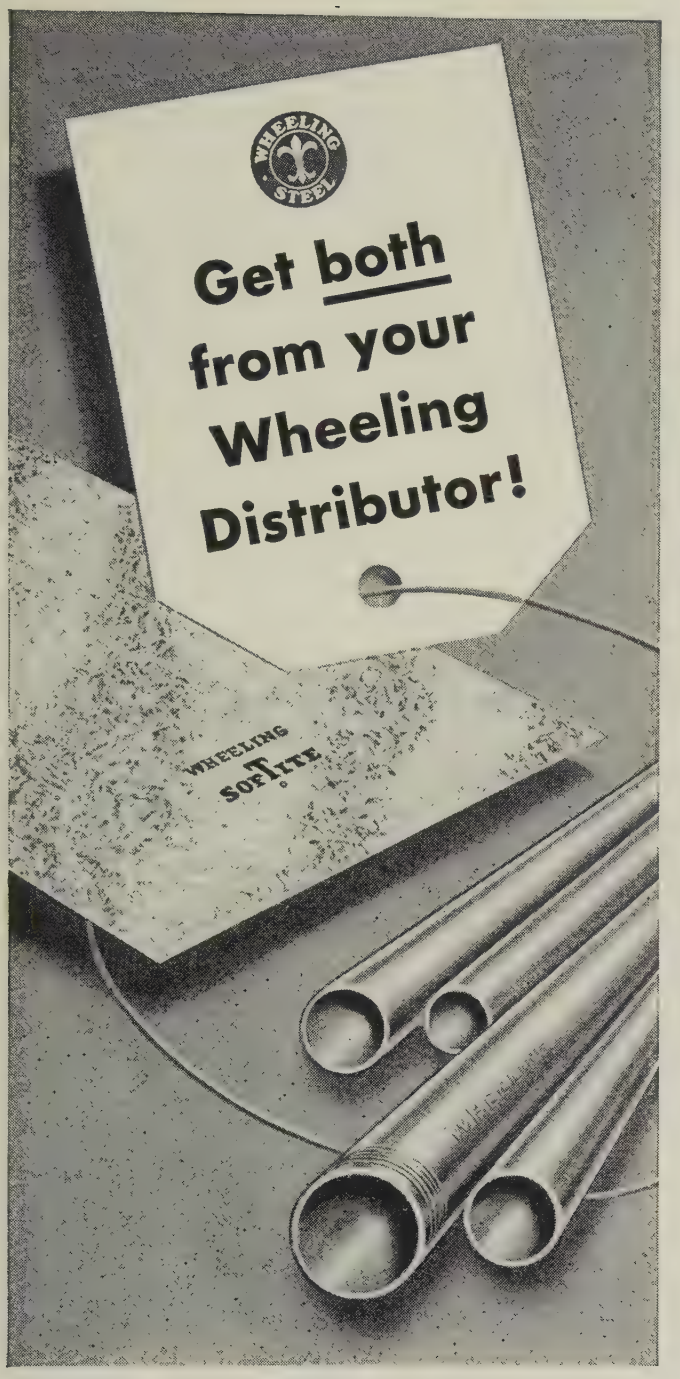
Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents: Atlanta, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	8.59§	9.86§	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.61	....	8.76	9.06	11.34#	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	53.50	9.42	9.73	12.90#	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	55.98	8.50	8.80	10.90#	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.00	53.00	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.34	9.48	10.05	52.43	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	9.95	55.68	8.33	8.69	10.80#	14.74	9.01	8.79	10.11
Dallas	8.85	10.15	....	....	9.00	8.95	11.01	....	9.00	9.45	10.70
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	9.82	9.74	11.06
Detroit	8.43	9.70	10.35	56.50	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	8.45	9.75	8.45	....	8.60	8.55	11.10	....	8.60	9.05	10.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	9.50	10.75	11.65	....	9.55	9.55	12.75	16.00	9.10	9.55	11.70
Milwaukee	8.33	9.58	10.13	....	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.35	....	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	53.08	9.31	9.57	12.76#	15.09	9.35	9.43	10.71
Norfolk, Va.	8.05	....	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.00	8.90	9.87	51.94	8.69	8.65	11.51#	15.01	8.50	8.77	9.77**
Pittsburgh	8.18	9.45	10.35	52.00	8.33	8.60	10.80#	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.38	11.35‡‡	8.65	14.65#	15.95	8.65	8.30	11.50
Richmond, Va.	8.45	....	10.40	....	9.15	9.15	....	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.36	....	8.54	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10.61	....	8.84	9.21	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	10.85	55.10	9.55	9.70	13.00	16.10	9.50	9.60	12.00
Seattle	9.95	11.15	12.00	57.38	10.00	10.10	14.05	16.35	9.80	9.70	12.10
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	9.95	11.15	12.00	57.38	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.48	9.58	....	....	9.06	9.15	9.73	....	9.35	8.86	10.36

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; [3]—400 to 9999 lb; [5]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.



WHEELING SOFTITE® GALVANIZED SHEETS

Use Wheeling SOFTITE on your next job and see how ductile and tight-coated a galvanized sheet can be. The coating won't chip or peel no matter how severely you fabricate it.

WHEELING CONTINUOUS WELD PIPE

Use Wheeling Continuous Weld Pipe on your next job and see how strong, ductile and uniform a steel pipe can be. It's made of Wheeling's own controlled analysis steel. Welds easier, lasts longer.

For the name of the Wheeling distributor nearest you contact the Wheeling district sales office in your city or write to Wheeling Steel Corporation, Wheeling, West Virginia.

WHEELING STEEL

IT'S WHEELING STEEL

DISTRICT SALES OFFICES—Atlanta, Boston, Buffa'o, Chicago, Cincinnati, Cleveland, Detroit, Houston, New York, Philadelphia, St. Louis, San Francisco.

NEED OVERLOAD PROTECTION?

Load Sentry, NEMA 12 Housing, price $225.00

With one pointer, you set the load limit anywhere on the dial. Another pointer shows running load on the motor. If an overload occurs, these pointers meet and a protective circuit is energized, or feed rate is changed, or the motor is shut down, as preferred.

EASY TO INSTALL: Eight easy connections to make—any plant engineer, electrician or maintenance man can do it.

ACCURATE: Meter-relay "heart" is able to detect two pieces of stock moving through a progressive die; 2% load increase will trigger protective circuit.

SAFE: After overload, an interlock prevents start-up until overload is cleared and reset button is pressed.

FAST: Shutdown or alarm is virtually immediate if overload occurs.

UNAFFECTED BY STARTING SURGE: No false shutdown while motor is drawing heavy starting current.

TO ORDER: Specify motor full load current; or horsepower, voltage, and phase.

Ask for Data Sheet 7-A

ASSEMBLY PRODUCTS, INC.
75 Wilson Mills Road • Chesterland 86, Ohio
Telephone: (Cleveland, Ohio) HAmilton 3-4436 and 3-4446

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Silica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry duty paid, metallurgical grade: European, $33-34; Mexican, all-rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	28.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$13.00-14.00*
Domestic, concentrates f.o.b. milling points	20.00-22.00

*Before duty.

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.39-1.42 per long ton unit, c.i.f. U. S. ports, duty for buyer's account: other than Indian, nominal; contracts by negotiation.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$51.00-53.00
48% 2.8:1	48.00-50.00
48% no ratio	41.00-43.00

South African Transvaal

48% no ratio	$34.00-41.00
44% no ratio	30.00-30.50

Turkish

48% 3:1	$55.00-57.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.60
60-65%	2.60-2.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over.. F.o.b. Riverton or Camden, N. J., west of Mississippi River.	10.50 / 9.50
Sponge Iron, Domestic, 98 + % Fe: Deld. east of Mississippi River, 23,000 lb and over F.o.b. Riverton, N. J., west of Mississippi River	10.50 / 9.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe..	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16. plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500 lb drum, frght allowed Carlots	39.50
Ton lots	41.50
Antimony, 500 lb lots	42.00*
Brass, 5000-lb lots	31.30-38.40†
Bronze, 5000-lb lots	48.10-52.70†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel unannealed	$1.065
Nickel-Silver, 5000-lb lots	49.20-61.30†
Phosphor-Copper, 5000-lb lots	59.80
Copper (atomized) 5000-lb lots	40.30-48.80‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.02
Stainless Steel, 316	$1.20
Tin	14.50*
Zinc, 5000-lb lots	17.50-30.70‡
Tungsten: Melting grade, 99%	Dollars
60 to 2000 mesh: 1000 lb and over	3.15
Less than 1000 lb	3.30
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Diam (in.)	Length (in.)	Per 100 lb
2	24	$60.75
2½	30	39.25
3	40	37.00
4	40	35.00
5⅛	40	34.75
6	60	31.50
7	60	28.25
8, 9, 10	60	28.00
12	72	26.75
14	60	26.75
16	72	25.75
17	60	26.25
18	72	26.25
20	72	25.25
24	84	26.00

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.75
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.25
Saginaw, Mich., deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, Ohio, ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Painesville, Ohio, ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
Neville Island (Pittsburgh), Pa., ovens.	29.25
St. Paul, ovens	29.75
Chicago, deld.	33.24
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.85 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	29.50
Industrial xylene	32.00-34.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00-34.00

Cents per pound, producing point

Phenol: Grade 1, 17.50; Grade 2-3, 15.50; Grade 4, 17.50; Grade 5, 16.50; Grade 6, 14.50.

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305...	$6.28	$6.23	$6.23	$6.48
Bar Size Angles	6.62	6.57	6.57	6.75
Structural Angles	6.62	6.57	6.57	6.75
I-Beams	6.87	6.82	6.82	7.00
Channels	6.87	6.82	6.82	7.00
Plates (basic bessemer)	8.35	8.30	8.30	8.60
Sheets, H.R.	8.25	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	9.00	8.95	8.95	9.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	26.79	26.67	26.67	27.36
Barbed Wire (†)	6.95	6.95	6.95	7.40
Merchant Bars	6.87	6.82	6.82	7.22
Hot-Rolled Bands	7.20	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.73	6.73	6.73	7.13
Wire Rods, O.H. Cold Heading Quality No. 5	7.07	7.07	7.07	7.47
Bright Common Wire Nails ($)	8.38	8.38	8.38	8.58

†Per 82 lb, net, reel. $Per 100-lb kegs, 20d nails and heavier.

WANTED
thoroughly experienced
SHIP ESTIMATORS

Immediate openings for thoroughly experienced ship estimators are now available at The INGALLS Shipbuilding Corporation's Gulf Coast yard at Pascagoula, Mississippi.

Here, the cost of living is lower than in big cities! And you'll like the pleasant Gulf climate, the excellent living and recreational facilities.

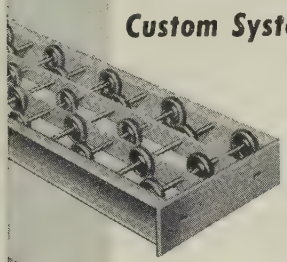
If you are thoroughly experienced in estimating ship work . . . if you are ready to meet a new challenge . . . if you would like to start working now for one of the largest shipyards in America, where there is a backlog of work for years to come . . . write immediately to W. R. Guest, Sr., President, or Jack Gray, Chief Estimator, The INGALLS Shipbuilding Corporation, Pascagoula, Mississippi.

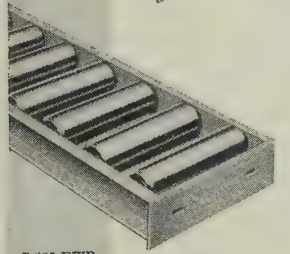
THE INGALLS SHIPBUILDING CORPORATION

PASCAGOULA, MISSISSIPPI

Buschman Wheel and Roller CONVEYORS

Custom Systems from Standard Units





Gravity conveying systems to meet your needs are set up quickly from Buschman wheel and roller components. Lightweight aluminum or steel construction and Quick-Eez coupling make rearrangement fast and easy.

Buschman wheel and roller components include straight and curved sections in three widths, switches, adjustable tubular stands and accessories.

Buschman wheel and roller conveyors are stocked at the factory and by leading distributors throughout the country, who can engineer systems to meet your needs.

Write today for Bulletin 15

C-100-EWB

PRODUCE MORE . . . FOR LESS with Buschman Conveyors

Complete Conveyor Systems For All Types of Industries
Engineered • Manufactured • Installed

THE E. W. BUSCHMAN CO.
4496 Clifton Ave. • Cincinnati 32, Ohio

For weight-saving design . . .

DRESSER Weldments

run rings around traditional methods!

Take this generator frame, for instance!

By switching to Dresser specialized ring-making facilities, the manufacturer effected a 31% reduction in weight and a 19% savings in cost.

Dresser starts with dissimilar stock close to finished dimensions . . . rolls and welds it under rigid control . . . expands it to accurate size. This makes possible substantial savings in weight, machining and material costs.

If you can visualize your product as a combination of circular shapes, we may be in a position to help you produce a better product at less cost. We'll gladly make recommendations at no cost to you. Just send us your print or sketch. Or, write for free catalog, number 56-S.

DRESSER®

Manufacturing Division
119 Fisher Avenue, Bradford, Pa.

ONE OF THE DRESSER INDUSTRIES

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $245, Johnstown, Duquesne, Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74% respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered, Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk. C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.
Cr 67.71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 21.25c, per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk. 3" x down and 2" x down, 27.50c per lb contained Cr, 14.20c per lb contained Si. 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot packed $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

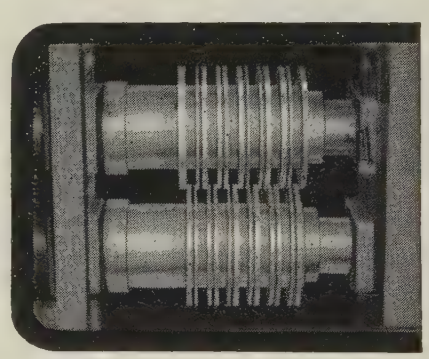
Carbortam: (1 to 2%). Contract, lump, carload 9.50c, per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CUT COSTS 3 WAYS!

WITH

COWLES

SLITTING KNIVES



Cowles knives are so accurate they can be assembled on an arbor quickly with little or no shimming, reducing set-up time. They stay on the job longer, require very infrequent interruption for re-grinding;— and — produce straight edged strip with minimum burr, preventing tie-ups in later forming operations.

For maximum satisfaction, specify Cowles, world's largest manufacturer of rotary slitting knives. Furnished in any face, diameter and bore, in our Max-Cut; Special Alloy; Super Alloy; Circle C; Super C; or any special analysis for slitting high and low carbon steels, stainless, silicon or non-ferrous metals. Prompt delivery!

Engineering Assistance On Any Slitting Job.

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Specializing in the Manufacture of

ROTARY SLITTING KNIVES • SPACING COLLARS • ROTARY TRIMMING KNIVES • ROLL TURNING TOOLS • EDGING ROLLS • CUT-OFF KNIVES STANDARD AND SPECIALLY ENGINEERED TOOLS FOR ALL FERROUS AND NON-FERROUS PROCESSING, TRIMMING AND FORMING REQUIREMENTS.

(*Concluded from Page* 249)

decline in operations at steel foundries is less severe.

Demand for pig iron has been adversely affected by the drop in scrap prices. Many casters find it advantageous to increase the ratio of scrap to iron in melts.

Most producers of merchant iron are stockpiling part of their production.

Steel Shipments Heavier

Shipments of finished steel products during the first nine months totaled 62,589,328 net tons, reports the American Iron & Steel Institute.

The second highest total reported for any comparable period, it is more than 1.7 million tons greater than the movement in the corresponding period last year, and it is only about 83,000 tons less than the record set in the first nine months of 1955.

September shipments amounted to 6,171,674 net tons, against 7,058,028 during the like month last year and 6,229,853 in August this year.

Heavy structural shape shipments set a nine-month record at 5,166,376 net tons. The previous high was 3,769,637 tons in 1942. Steel piling shipments (443,211 tons) also set a record.

Three other records: The cumulative total of line pipe shipments was 3,262,249 tons, about 589,000 above the previous high of 2,673,380 shipped in the like period of 1953. Oil country goods shipments were also at a new peak at 2,268,209 tons. So were electrolytic tin plate shipments at 3,911,688 tons.

Gains were shown in other products, including plates, rails and accessories, reinforcing bars, tin mill products, and semifinished products.

The principal markets during the first nine months this year: Warehouses and distributors, 11,708,222 net tons; automotive, 10,392,996; construction (including maintenance), 9,637,526; oil and gas warehouses, 1,905,028.

REINFORCING BARS . . .

REINFORCING BARS PLACED

160 tons, Washington State highway project; Thurston County, to Bethlehem Pacific Coast Steel Corp., Seattle; T. T. Burnham, Seattle, general contractor.

155 tons, office building, Farm Bureau Mutual Insurance Co., Concord, N. H., to Joseph T. Ryerson & Son Inc., Boston, through the Gilbane Building Co., Pawtucket, R. I.

143 tons, Montana project by Bureau of Public Roads, to Bethlehem Pacific Coast Steel Corp., Seattle.

115 tons, highway bridges and structures, Henry and Williams counties, Ohio, to Pollak Steel Co., Cincinnati, through E. K. Bridge Construction Co., Toledo, Ohio.

105 tons, town office building, Methuen, Mass., to Northern Steel Inc., Medford, Mass., through Singleton Construction Co., Tewksbury, Mass.

100 tons, or more, science building, Clark University, Worcester, Mass., to U. S. Steel Supply Div., U. S. Steel Corp., Boston, and United Structural Co., Worcester, Mass., through J. W. Bishop Co., Worcester.

REINFORCING BARS PENDING

650 tons, municipal parking garage, Kingston-Bedford streets, Boston.

410 tons, Montana State overpass, Yellowstone County; bids in.

300 tons, steel sheet piling, U. S. Engineer, Philadelphia.

245 tons, three state highway bridges, Bangor, Maine; bids Nov. 13, Augusta, Maine.

200 tons, Washington State library, Olympia, Wash.; general contract to Kuney-Johnson Co., Seattle, low at $870,083.

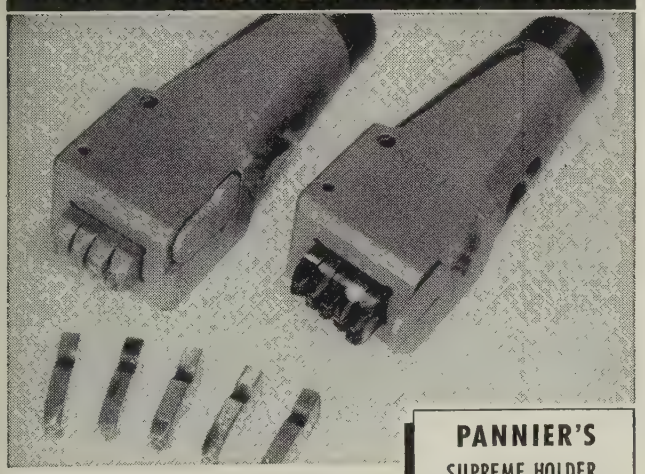
190 tons, five state highway bridges, Bow-Concord, N. H.; Lane Construction Corp., Meriden, Conn., general contractor.

175 tons, Idaho state road project, S. S. Mullen Inc., Seattle, general contractor.

170 tons, two Washington State undercrossings, Grant County; general contracts to Cherf Bros. & Sandkay Contractors Inc., Ephrata, Wash., low at $159,345 and $157,228, respectively.

160 tons, state highway bridge, Farmington River, Farmington, Conn.; bids Nov. 12, Hartford, Conn.; also 85 tons of steel piles.

ANOTHER *PANNIER* MASTER MARKER!



New Roto-Pin type lock is integral part of *all* Pannier Supreme Holders . . . eliminates loose, bent, dropped, or lost pins . . . flip it open to change type . . . flip it back to securely lock type in clear-marking position.

PANNIER'S SUPREME HOLDER WITH ROTO-PIN LOCK

Safe, fast type changing. Holder in variety of styles.
Machined from High-Grade Bar Tool Steel.
Hardened anvil maintains type alignment.
Striking Head of Tool Steel . . . Replaceable to add long service life to Holder.

Write for complete data.

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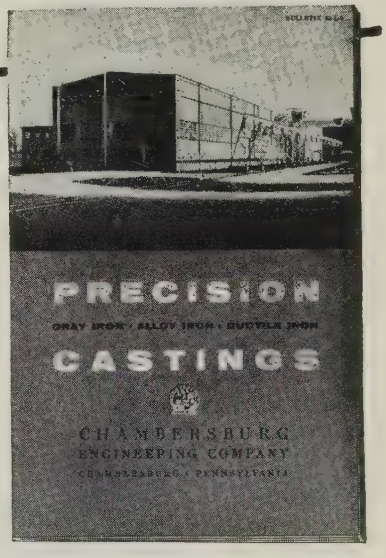
Do you require large castings of high quality?



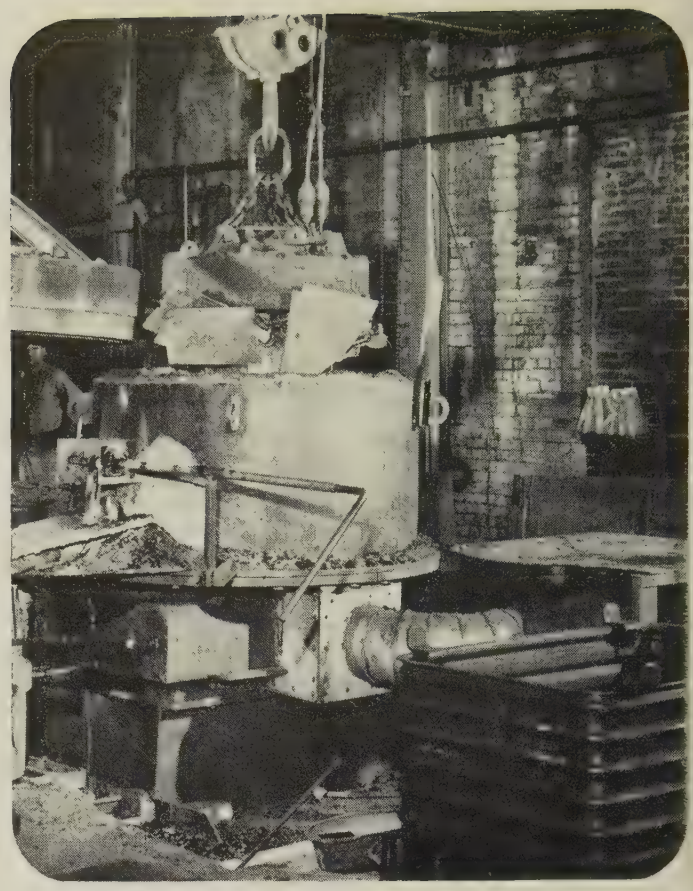
Send for this new booklet on Chambersburg's modern foundry and the cement-bonded sand castings produced there. As a result of the accuracy and excellent quality of these castings, marked reductions in finish machining is often possible.

CHAMBERSBURG ENGINEERING COMPANY

Phone Casting Sales Dept.

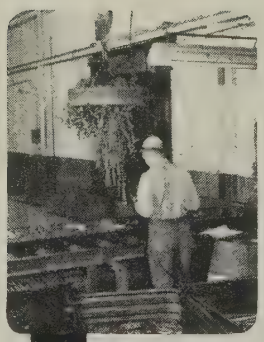
563 Derbyshire St. Chambersburg, Pa.

5 ways to make your foundry more efficient with OHIO MAGNETS



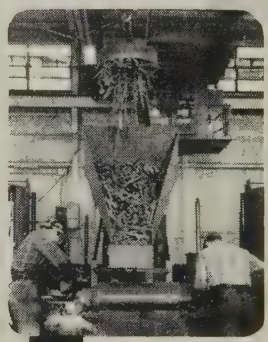
1 CHARGING FURNACE. One 36-inch Ohio Bolted Magnet charges six 375 KW furnaces giving 240 500-pound heats each 24 hours.

2 SCRAP HANDLING. All scrap is handled efficiently, economically with Ohio Magnet. Single 36-inch magnet replaces grapple, clamshell, bucket or lift truck.



3 SORTING. Castings are conveyed from Wheelabrator to hard-iron inspection. Ohio Magnet picks parts out of sorting bins.

4 UNLOADING ANNEALING FURNACE now takes one man 10 to 20 minutes with Ohio Magnet. Lift truck used to take 1 to 2 hours.



5 LOADING GRINDING HOPPER after conveying parts from inspection department. Same Ohio Magnet is used for operations shown in photos 3, 4 and 5.

Photos: Courtesy I-F Manufacturing Company, New Philadelphia, Ohio

ohio ELECTRIC

CHESTER BLAND
President

Small foundry or large, magnetic materials handling points the way to higher productivity, higher efficiency. And with Ohio Magnets on the job you get high availability, too. That's because Ohio Magnets are built with that extra margin of safety that means long, service-free life. Yes, *magnetic materials handling pays—especially with Ohio Magnets.*

THE OHIO ELECTRIC MFG. CO.

5400 Dunham Road • Maple Heights • Ohio

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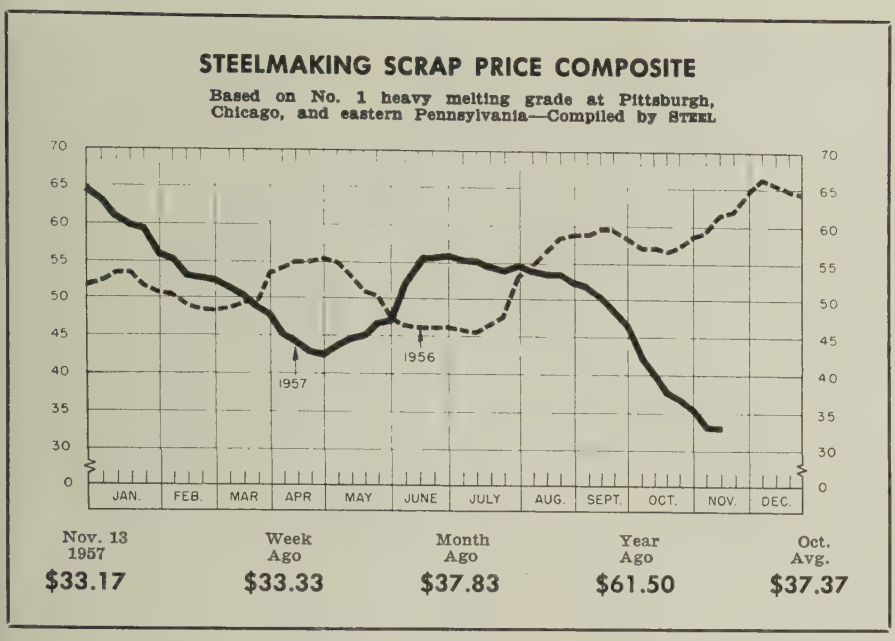

Scrap Price Decline Slowing Down

Market appears to be leveling out despite continued absence of representative mill buying. STEEL's composite on prime grade slipped only 16 cents to $33.17 last week

Scrap Prices, Page 264

Pittsburgh — Resistance to the downward price trend is developing. Mills have sufficient inventories to remain out of the open market the remainder of this year. One area mill bought No. 2 bundles at $29 last week, which was $3 higher than an earlier "distress" sale of that grade the week before. Railroad grades also firmed on the latest lists, indicating the market may be developing a slightly stronger tone.

Chicago—The buyer's market in scrap continues, with prices of a few steelmaking grades dipping $1 to $2 a ton. The district steelmaking rate is slightly above 80 per cent of capacity, the lowest since early November, 1954.

Most brokers and dealers are cleaning up old commitments and refraining from active booking of business. Plentiful supplies of melting material are available for small mill purchases.

Philadelphia — Heavy melting steel prices are off $1 a ton, and railroad specialties $5, based on recent list sales. Couplers, springs, and wheels are quoted at $49. No. 1 bundles and busheling are $1 over No. 1 heavy melting.

Buying is light, and prices on some grades are nominal, including turnings, in the absence of sales. On new transactions, No. 1 cupola cast is off $2, now being quoted at $39. Heavy breakable also is lower.

New York — Steel scrap prices are unchanged. While domestic buying is light, and exports are confined to carryovers, the sharp decline in brokers' prices appears to have been arrested. For six weeks prices headed downward, with No. 1 heavy melting dropping to $34, shipping point.

The steel mills are operating partly on inventories, but dealers are resisting further price declines by holding back tonnage. Additional export tonnage will be negotiated within the next week or so.

Boston—On the average, foundry scrap prices are about 20 per cent below the peaks they reached early this year. Steel scrap is off even more. While the tide has not definitely turned, prices may have touched bottom on the current movement. Brokers' prices are unchanged on most grades, and yards are more reluctant to move tonnage at the lower prices.

Cleveland — Conditions in the scrap market are about the same as they were a week ago. Consumers are showing virtually no interest in offerings, and with steelmaking operations declining, mill stocks are more than adequate to support the current rate. Dealers are piling unprepared material in their yards. This is seen as a sign that current prices are unattractive. The general view is that the market is not yet on bottom.

Youngstown—The scrap market remains in the doldrums, but two local mills bought small tonnages of No. 1 heavy melting industrial material. A Pittsburgh consumer is reported to have offered $29-$30 for No. 2 bundles, but local scrap traders were not interested because of the $4.50 to $5 freight which they would have to absorb.

Detroit — The price on No. 1 bundles moved up slightly last week on the basis of a single order placed by Great Lakes Steel Corp. Other No. 1 and No. 2 grades advanced sympathetically, but no firm orders were reported.

Foundry grades of scrap slipped lower in the absence of orders. Expectations are that the market will drop again next week.

Cincinnati—Prices are marking time, with representative buying still lacking. Dealers are refusing to sell at the depressed level prevailing, and some of them think the bottom has been reached.

Buffalo — Prices are marking time following the sharp drop at the beginning of the month. That was when local mills placed November delivery tonnage. The immediate outlook for demand and prices remains bearish. Steel mill operations are declining. The mills are using an increasingly larger percentage of hot metal in their reduced melts at the expense of scrap.

St. Louis—Prices continue their downward drift. There is virtually no buying. Mill stocks run 75 to 90 days, and most foundries are operating less than five days weekly. Industrial scrap is being produced in fair volume, and supplies are excessive. Broker buying prices on railroad material are off $2 to $5.

(*Please turn to Page* 269)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Nov. 13, 1957. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 13	$33.17
Nov. 6	33.33
Oct. Avg.	37.37
Nov. 1956	61.83
Nov. 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*30.00-31.00*
No. 1 factory bundles	*36.00-37.00*
No. 1 dealer bundles	*32.00-33.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*32.00-33.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Cut structurals:	
2 ft and under	38.00-39.00
3 ft lengths	37.00-38.00
Heavy turnings	30.00-31.00
Punchings & plate scrap	37.00-38.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	35.00-36.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	44.00-45.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*
Rails, 2 ft and under	*58.00-59.00*
Rails, 18 in. and under	*59.00-60.00*
Angles, splice bars	*52.00-53.00*
Rails, rerolling	*58.00-59.00*

Stainless Steel Scrap

18-8 bundles & solids	210.00-215.00
18-8 turnings	115.00-120.00
430 bundles & solids	95.00-100.00
430 turnings	65.00-70.00

CLEVELAND

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*22.00-23.00*
No. 1 factory bundles	*31.00-32.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*28.00-29.00*
Machine shop turnings	*11.00-12.00*
Short shovel turnings	*15.00-16.00*
Mixed borings, turnings	*15.00-16.00*
Cast iron borings	*15.00-16.00*
Cut foundry steel	*33.00-34.00*
Cut structurals, plates 2 ft and under	*35.00-36.00*
Low phos. punchings & plate	*29.00-30.00*
Alloy free, short shovel turnings	*21.00-22.00*
Electric furnace bundles	*29.00-30.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Charging box cast	*33.00-34.00*
Heavy breakable cast	*29.00-30.00*
Stove plate	*36.00-37.00*
Unstripped motor blocks	*23.00-24.00*
Brake shoes	*30.00-31.00*
Clean auto cast	*37.00-38.00*
Burnt cast	*28.00-29.00*
Drop broken machinery	*40.00-41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*
R.R. malleable	*49.00-50.00*
Rails, 2 ft and under	*55.00-56.00*
Rails, 18 in. and under	*56.00-57.00*
Rails, random lengths	*48.00-49.00*
Cast steel	*43.00-44.00*
Railroad specialties	*46.00-47.00*
Uncut tires	*39.00-40.00*
Angles, splice bars	*46.00-47.00*
Rails, rerolling	*54.00-55.00*

Stainless Steel
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-210.00
18-8 turnings	90.00-95.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*31.00-32.00*
No. 2 bundles	*24.00-25.00*
No. 1 busheling	*31.00-32.00*
Machine shop turnings	*13.00-14.00*
Short shovel turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Low phos.	*33.00-34.00*
Electric furnace bundles	*33.00-34.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*

CHICAGO

No. 1 heavy melt., indus.	*34.00-35.00*
No. 1 hvy melt., dealer	*30.00-31.00*
No. 2 heavy melting	29.00-30.00
No. 1 factory bundles	*36.00-37.00*
No. 1 dealer bundles	*31.00-32.00*
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	*34.00-35.00*
No. 1 busheling dealer.	*30.00-31.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	19.00-20.00
Short shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut structurals, 3 ft.	39.00-40.00
Punchings & plate scrap	40.00-41.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Stove plate	34.00-35.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	40.00-41.00
Drop broken machinery	40.00-41.00

Railroad Scrap

No. 1 R.R. heavy melt.	*36.00-37.00*
R.R. malleable	45.00-46.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	46.00-47.00
Axles	48.00-49.00
Rails, rerolling	*46.00-47.00*

Stainless Steel Scrap

18-8 bundles & solids	205.00-215.00
18-8 turnings	105.00-115.00
430 turnings & solids	80.00-90.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*22.00-23.00*
No. 2 heavy melting	*20.00-21.00*
No. 1 bundles	*24.00-25.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*22.00-23.00*
Machine shop turnings	9.00-10.00
Mixed borings, turnings	10.00-11.00
Short shovel turnings	11.00-12.00
Punchings & plate scrap	*27.00-28.00*

Cast Iron Grades

No. 1 cupola	*32.00*
Stove plate	*26.00*
Charging box cast	*25.00*
Heavy breakable	*25.00*
Unstripped motor blocks	15.00†
Clean auto cast	*34.00*
Malleable	*34.00†*

†Nominal

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*37.00*
No. 2 heavy melting	*34.00*
No. 1 bundles	*37.00*
No. 2 bundles	*26.00*
No. 1 busheling	*37.00*
Machine shop turnings	17.00
Short shovel turnings	19.00

Cast Iron Grades

No. 1 cupola	*43.00*
Charging box cast	*35.00*
Heavy breakable cast	*35.00*
Unstripped motor blocks	*35.00*
Brake shoes	40.00
Clean auto cast	*43.00*
Stove plate	*38.00*

Railroad Scrap

No. 1 R.R. heavy melt.	38.25
Rails, 18 in. and under	*50.00*
Rails, random lengths	*45.00*
Rails, rerolling	*55.00*
Angles, splice bars	*47.00*

PHILADELPHIA

No. 1 heavy melting	*34.50*
No. 2 heavy melting	*31.50*
No. 1 bundles	*35.50*
No. 2 bundles	*25.50*
No. 1 busheling	*35.50*
Electric furnace bundles	41.00
Mixed borings, turnings	23.00†
Short shovel turnings	25.00
Machine shop turnings	22.00†
Heavy turnings	*31.50*
Structurals & plate	*43.00-45.00*
Couplers, springs, wheels	*49.00*
Rail crops, 2 ft & under	*63.00-65.00*

Cast Iron Grades

No. 1 cupola	*39.00*
Heavy breakable cast	*39.00*
Malleable	59.00
Drop broken machinery	*50.00-51.00*

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	34.00-35.00
No. 2 bundles	21.00-22.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Short shovel turnings	15.00-16.00
Low phos. (structurals & plate)	45.00-46.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Unstripped motor blocks	32.00-33.00
Heavy breakable	33.00-34.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	55.00-60.00
430 sheets, clips, solids	55.00-60.00
410 sheets, clips, solids	50.00-55.00

†Nominal

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	27.00-28.00
No. 2 bundles	15.00-16.00
No. 1 busheling	27.00-28.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Short shovel turnings	12.00-13.00
No. 1 cast	33.00-34.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	38.00-39.00

BUFFALO

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	32.00-33.00
No. 2 bundles	27.00-28.00
No. 1 busheling	32.00-33.00
Mixed borings, turnings	18.00-19.00
Machine shop turnings	16.00-17.00
Short shovel turnings	20.00-21.00
Cast iron borings	18.00-19.00
Low phos.	37.00-38.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	41.00-42.00
No. 1 machinery	46.00-47.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	51.00-52.00
Railroad specialties	37.00-38.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	30.00-31.00
No. 2 bundles	*20.00-21.00*
No. 1 busheling	30.00-31.00
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	18.00-19.00
Short shovel turnings	*17.00-18.00*
Cast iron borings	18.00-19.00
Low phos. 18 in.	37.00-38.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Heavy breakable cast	32.00-33.00
Charging box cast	32.00-33.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	54.00-55.00
Rails, random lengths	*44.00-45.00*

BIRMINGHAM

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	*31.00-32.00*
No. 2 bundles	*16.00-17.00*
No. 1 busheling	*31.00-32.00*
Cast iron borings	*15.00-16.00*
Short shovel turnings	21.00-22.00
Machine shop turnings	20.00-21.00
Bar crops and plates	*38.00-39.00*
Structurals & plate	38.00-39.00
Electric furnace bundles	*35.00-36.00*
Electric furnace:	
3 ft and under	*33.00-34.00*
2 ft and under	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	47.00-48.00
Stove plate	47.00-48.00
Unstripped motor blocks	*35.00-36.00*
Charging box cast	*22.00-23.00*
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 18 in. and under	*49.00-50.00*
Rails, rerolling	*50.00-51.00*
Rails, random lengths	*41.00-42.00*
Angles, splice bars	*40.00-41.00*

SEATTLE

No. 1 heavy melting	*36.00*
No. 1 bundles	*35.00*
No. 2 heavy melting	*34.00*
No. 2 bundles	*27.00*
Machine shop turnings	26.00†
Mixed borings, turnings	26.00†
Electric furnace No. 1	*46.00*

Cast Iron Grades

No. 1 cupola	35.00†
Heavy breakable cast	32.00†
Unstripped motor blocks	27.00†
Stove plate (f.o.b. plant)	25.00†

†Nominal

LOS ANGELES

No. 1 heavy melting	39.00
No. 2 heavy melting	37.00
No. 1 bundles	38.00
No. 2 bundles	30.00
Machine shop turnings	20.00
Shoveling turnings	25.00
Cast iron borings	25.00
Cut structurals and plate 1 ft and under	54.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	52.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	34.00
No. 2 bundles	26.00
Machine shop turnings	*20.00*
Mixed borings, turnings	*20.00*
Cast iron borings	*20.00*
Heavy turnings	*20.00*
Short shovel turnings	*20.00*
Cut structurals, 3 ft.	48.00

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Stove plate	39.00
Heavy breakable cast	38.00
Unstripped motor blocks	36.00
Clean auto cast	47.00
No. 1 wheels	40.00
Drop broken machinery	47.00

HAMILTON, ONT.

No. 1 heavy melting	35.00
No. 2 heavy melting	30.00
No. 1 bundles	35.00
No. 2 bundles	25.00
Mixed steel scrap	30.00
Mixed borings, turnings	20.00
Busheling, new factory:	
Prepared	35.00
Unprepared	29.00
Short steel turnings	24.00
Rails, rerolling	43.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b. Hamilton, Ont.

for the purchase or sale of **scrap**

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Metal Buying Sluggish

Look for hand-to-mouth purchases to continue the rest of the fourth quarter. Nonferrous castings improve, but they're still under 1956 pace. Dow buys Velasco

Nonferrous Metal Prices, Pages 268 & 269

METAL sales are at disappointing levels. Even the most optimistic observers see litttle chance of an early pickup great enough to lift the industry out of its slump.

Zinc—Demand still lags, with scant hope for any change the next 30 to 60 days. Some companies report sales for appliance and automotive diecastings are higher; others say neither market has lived up to expectations. Sales to steel companies for galvanizing are off, but several firms report fair shipments of hot-dip galvanizing to job shops. Brass mill demand remains weak.

The 10 cent a pound price appears stable for the moment since producers will probably resist any move to lower it. But some warn further production cutbacks are in order if the price line is to hold.

Lead—Sales are a little better but still run below expectations. Shipments to battery, tetraethyl lead, and sheet makers hold up. Most producers believe a protective tariff would firm the market and stimulate a price rise.

Copper—Custom smelters raised their price 0.5 cent to 26 cents a pound on Nov. 6 in an effort to stimulate sales. Their reasoning: 1. Demand was good. 2. The London Metal Exchange price was rising. 3. Smelters' stocks were low.

Since the price bump, demand has fallen again. Reason: Interest in buying for 1958 (which caused the temporary spurt) is down, though customers are still taking small tonnage for immediate use. It's felt that if sales don't rise over present levels, the price cannot be maintained at the current 26 cent level.

Primary producers report demand is still weak in the U. S., a little better in Europe. Sales to brass and tube mills have been disappointing. Sheet demand is weaker.

Aluminum—There's no noticeable pickup here. Diecastings, extrusions, and foil are all doing "fair" to "well." So are pigments and chemicals. But there are no real signs of strength in the market and little likelihood that it will improve substantially in the fourth quarter.

Castings Up Some

Shipments of aluminum castings (excluding diecastings) in the fourth quarter are expected to increase 21 per cent over those of the third, believes Kaiser Aluminum & Chemical Corp. Estimates peg fourth quarter shipments at 106.7 million lb, or an average of 35.6 million lb a month. Breakdown: Permanent mold castings will account for 64.7 million lb, sand 42 million lb.

Even with a good fourth quarter, shipments this year will probably fall 3.6 per cent below the 1956 figure. Through July, shipments of aluminum sand and permanent mold castings were 7.6 per cent below the figure for the first seven months of 1956.

Casters are optimistic about 1958's first quarter, says Kaiser. Total sand and permanent mold shipments in the period are estimated at 113 million lb, or an average of about 37.5 million lb a month.

Why Imports Are Cheaper

Some industry sources have charged that the main reason foreign brass mills can undersell domestic mills is the lower price paid for copper rather than lower wage scales (see STEEL, Oct. 28, p. 282).

It's true a difference does exist between the London Metal Exchange price and domestic quotations. This year, the LME has consistently been under the U. S. figure.

But brass mill imports were cheaper in this country during years when the LME figure was higher than the domestic price. For example: In 1955, the LME average price was 44.034 cents a pound; in 1954, 31.169 cents a pound; and in 1953, 32.034 cents a pound. During these years, the domestic price was consistently lower: 37.491 cents a pound in 1955; 29.694 cents in 1954, and 28.798 cents in 1953. The figures seem to back up the contention that low foreign wages are the chief reason overseas mills can undersell the domestic industry.

Dow Buys Velasco

Dow Chemical Co. has purchased the government-owned magnesium plant at Velasco, Tex., for $20.7 million. Dow has been operating the 90 million lb a year plant on a lease basis.

NONFERROUS PRICE RECORD

	Price Nov. 13	Last Change	Previous Price	Oct. Avg	Sept. Avg	Nov., 1956 Avg
Aluminum ..	26.00	Aug. 1, 1957	25.00	26.000	26.000	25.000
Copper	25.50–27.00	Nov. 13, 1957	26.00–27.00	26.361	26.469	35.956
Lead	13.30	Oct. 14, 1957	13.80	13.504	13.800	15.800
Magnesium .	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	64.500
Tin	90.125	Nov. 13, 1957	89.75	91.843	93.422	111.049
Zinc	10.00	July 1, 1957	10.50	10.000	10.000	13.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

When the pressure's on...

Bridgeport DURONZE* is the choice

*Aluminum Silicon Bronze

Superior wear resistance and good machinability make Bridgeport Duronze 707 (Aluminum Silicon Bronze) an ideal material for many products.

Take, for example, its use by Chicago Pneumatic Tool Co., New York, N. Y., in the oil pump gears used in their rotary portable and stationary Class "P" compressors.

These gears pump the lubricating oil which seals rotary compressor vane clearances, lubricates vital parts and also cools the air during compression. In meeting the precise requirements of this job, Duronze's combination of high strength, wear resistance and machinability are equally important advantages.

In the annealed condition, in which it is generally supplied, Duronze has an average tensile strength of 90,000 lbs. per square inch. Its endurance limit is over twice that of Naval Brass and it is generally superior in corrosion and wear resistance.

Duronze is only one of Bridgeport's complete line of copper and brass alloys in sheet, rod, wire and tube, designed to help you meet a wide variety of product and production applications better, faster and more economically. To help you in choosing the right alloy for your specific needs, you can expect and get experienced assistance from your Bridgeport Salesman and from the Technical Staff behind him. For prompt service, give your local Bridgeport Sales Office a call today.

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Bridgeport Brass Company, Bridgeport 2, Connecticut
In Canada: Noranda Copper and Brass Limited, Montreal

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 31.30; No. 241, 31.50; No. 356, 29.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.50-26.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per ton, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $120 per lb, nom.

Copper: Electrolytic, 27.00 deld.; custom smelters, 25.50-26.00; lake, 27.00 deld.; fire refined, 26.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $86-110 nom. per troy oz.

Lead: Common, 13.30; chemical, 13.40; corroding, 13.40, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $227-230 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $80-100 per troy oz nom.

Palladium: $21-24 per troy oz.

Platinum: $81-87 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $10.50 per lb, commercial grade.

Silver: Open market, 90.375 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 90.125.

Titanium: Sponge, 99.3+ %, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.50 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+ % hydrogen reduced, $4.10-4.20.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.75-30.25; No. 12 foundry alloy (No. 2 grade), 21.75-23.00; 5% silicon alloy, 0.60 Cu max., 25.50-26.00; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 24.75-26.75; 108 alloy, 22.25-23.00. Steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 23.75; grade 2, 22.00; grade 3, 20.75; grade 4, 19.00.

Brass Ingot: Red brass, No. 115, 27.25; tin bronze, No. 225, 36.00; No. 245, 30.75; high-leaded tin bronze, No. 305, 31.25; No. 1 yellow, No. 405, 22.75; manganese bronze, No. 421, 24.50.

Magnesium Alloy Ingot: AZ63A, 40.75; AZ91B, 37.25; AZ91C, 40.75; AZ92A, 40.75.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.82, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.80, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 32.355; l.c.l., 32.98. Weatherproof, 30,000-lb lots, 33.66; l.c.l., 34.78. Magnet wire deld., 40.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $19.00 per cwt; pipe, full coils, $19.00 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 20.50; plates 19.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.00-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.136	43.10-47.60	.....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.17	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.70	47.50
5050-F	43.80	48.60
3004-F	44.80	50.50
5052-F	45.40	51.20
6061-T6	46.90	53.00
2024-T4*	50.60	57.40
7075-T6*	58.40	66.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	....
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	....
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	....
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	....
2.563-3.375	53.20	51.70	....	....

Forging Stock: Round, Class 1, 45.20-58.60 in specific lengths, 36-144 in., diam. 0.375-8 in. Rectangles and squares, Class 1, 50.50-66.60 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.00
1¼	41.30	6	296.10
1½	49.40	8	445.50

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	60.60-64.80
12-14	45.70-47.20	61.30-65.80
15-17	45.90-47.90	62.50-67.50
18-20	46.50-48.30	64.50-70.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.) Aluminum: 1100 clippings, 13.50-14.00; old sheets, 10.50-11.00; borings and turnings, 6.50-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.13b	47.36c	....	50.32	23.000	23.000	22.250
Yellow Brass	44.02	32.30d	44.56	46.93	17.375	17.125	15.750
Low Brass, 80%	46.50	46.44	47.04	49.31	19.500	19.250	18.750
Red Brass, 85%	47.37	47.31	47.91	50.18	20.250	20.000	19.500
Com. Bronze, 90%	48.78	48.72	49.32	51.34	21.000	20.750	20.000
Manganese Bronze	52.01	46.11	56.61	....	16.125	15.875	15.375
Muntz Metal	46.39	42.20	....	....	16.375	16.125	15.625
Naval Brass	48.27	42.58	55.33	51.68	16.125	15.875	15.375
Silicon Bronze	54.76	53.95	54.80	56.74e	22.625	22.375	21.625
Nickel Silver, 10%	60.43	62.75	62.75	....	23.625	23.375	11.813
Phos. Bronze, A-5%	69.07	69.57	69.57	70.75	23.750	23.500	22.500

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

7.00; crankcases, 10.50-11.00; industrial castings, 10.50-11.00.

Copper and Brass: No. 1 heavy copper and wire, 19.00-19.50; No. 2 heavy copper and wire, 17.00-17.50; light copper, 15.50-16.00; No. 1 composition red brass, 15.50-16.00; No. 1 composition turnings, 15.00-15.50; new brass clippings, 13.00-13.50; light brass, 9.00-9.50; heavy yellow brass, 11.00-11.50; new brass rod ends, 12.00-12.50; auto radiators, unsweated, 12.00-12.50; cocks and faucets, 12.00-12.50; brass pipe, 12.50-13.00.

Lead: Heavy, 8.50-9.00; battery plates, 4.00-4.25; linotype and stereotype, 11.50-11.75; electrotype, 10.50-10.75; mixed babbitt, 11.00-11.50.

Monel: Clippings, 33.00-35.00; old sheets, 30.00-32.00; turnings, 22.00-25.00; rods, 33.00-35.00.

Nickel: Sheets and clips, 50.00-55.00; rolled anodes, 50.00-55.00; turnings, 45.00-50.00; rod ends, 50.00-55.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.50-17.50; 3003 clippings, 16.50-17.50; 6151 clippings, 16.00-17.50; 5052 clippings, 16.00-17.00; 2014 clippings, 15.50-17.00; 2017 clippings, 15.50-17.00; 2024 clippings, 15.50-17.00; mixed clippings, 15.00-16.00; old sheets, 13.50; old cast, 13.50; clean old cable (free of steel), 16.00-16.50; borings and turnings, 13.50-15.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 53.00; light scrap, 48.00; turnings and borings, 33.00.

Copper and Brass: No. 1 heavy copper and wire, 22.00; No. 2 heavy copper and wire, 20.25; light copper, 18.00; refinery brass (60% copper) per dry copper content, 19.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 22.00; No. 2 heavy copper and wire, 20.25; light copper, 18.00; No. 1 composition borings, 19.00; No. 1 composition solids, 19.50; heavy yellow brass solids, 13.25; yellow brass turnings, 12.25; radiators, 15.50.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 45.29; oval, 43.50, 5000-10,000 lb; electrodeposited, 35.75, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 108.5; 200-499 lb, 107.00; 500-999 lb, 106.50; 1000 lb or more, 106.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums. **Chromic Acid:** 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 71.60; 300-900 lb, 69.60.

Copper Sulphate: 100-1900 lb, 14.55; 2000-5900 lb, 12.55; 6000-11,900 lb, 12.30; 12,000-22,900 lb, 12.05; 23,000 lb or more, 11.55.

Nickel Chloride: Less than 400 lb, 35.00; 400-9990 lb, 33.00; 10,000 lb, 32.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 73.20; 100-600 lb, 64.20; 700-1900 lb, 61.50; 2000-9900 lb, 59.60; 10,000 lb or more, 58.30.

Stannous Chloride (anhydrous): Less than 25 lb, 162.20; 25 lb, 127.20; 100 lb, 112.20; 400 lb, 109.80; 5200-19,600 lb, 97.60; 20,000 lb or more, 85.40.

Stannous Sulphate: Less than 50 lb, 125.20; 50 lb, 95.20; 100-1900 lb, 93.20; 2000 lb or more, 91.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 263*)

Birmingham — An Atlanta mill last week purchased No. 2 heavy melting at $30, delivered, and No. 2 bundles at $20.

Los Angeles—Local dealers see no early pickup in buying, with mill inventories large. Prices are unchanged, but the market undertone is weak.

San Francisco—Steel scrap is being exported, but volume is off noticeably from what it was some months ago. Last month, a couple cargoes left this port for Japan.

Washington—Dealers of rerolling rails expect lower demand in 1958. According to the Business & Defense Services Administration, the dealers think supplies will remain at 1957 levels and should be adequate for domestic and foreign needs.

At a recent meeting with BDSA, dealers said adequate supplies will be generated by railroad improvement programs for a few years.

Says Scrap Will Recover

Despite widespread withdrawal of customers as buyers, the scrap market will ultimately recover, E. C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc., told the Southern New England Chapter recently.

He attributes adverse conditions to steelmakers' erratic buying. Price peaks and valleys could be eliminated by more systematic purchasing, he stated. Superior quality scrap at half the record price it commanded last December is going begging.

Steel Output Sets Record

Production of ingots and steel for castings during the first ten months set a record at 96,899,075 net tons, reports the American Iron & Steel Institute. The total was more than 3 million tons above the figure for the same period in 1956. The former record, 96,285,168 tons, was set in 1955.

October steel output was estimated at 9,195,000 net tons, up slightly from the September total of 8,977,906 tons.

Through October, the industry operated at 87.2 per cent of capacity. The index of production was 138.9, based on 1947-49 average.

FOR SALE — 1 Model 15 Bell Prime Mover, Serial #3433 complete with bucket and dual tires. Used very little and in excellent condition. Sale price $350.00.

FOR SALE—1 Chicago Pneumatic Compressor Serial #10155. Size 8 x 8 with capacity of 150 CFM. Complete with 25 HP Wagner motor. 1150 RPM. 3 Phase. 60 Cycle. 220/440 Volt. Serial #7311644. Compressor and motor in excellent condition. Total price $400.00.

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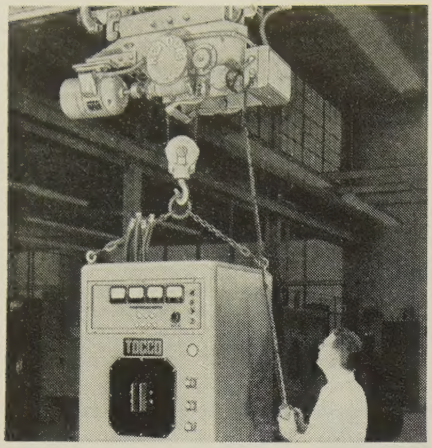
LOOKING FOR SURPLUS MACHINERY?

By checking the classified pages of STEEL each week you'll be able to find many different types of equipment which will fit your requirements. Used or surplus equipment—you can best find it in STEEL's classified columns.



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